Department of Electrical and Electronic Engineering

B.Sc. in Electrical and Electronic Engineering

Syllabus for 4 year B.Sc. Engineering Course

Revised on 16.09.2019

In the 4th meeting ofCommittee of Courses.

Members of Committee of courses:

Serial No	Name	Designation
1	Prof. Dr. Md. Nazrul Islam Mondal	Professor and Head, Department of Electrical and Electronic Engineering, Varendra University.
2	Dr. Ajay Krishno Sarkar	Professor and External Academic Member, Dept. of Electrical and Electronic Engineering, Rajshahi University of Engineering and Technology
3	Dr. Md. ShamimAnowar	Professor and External Academic Member, Dept. of Electrical and Electronic Engineering, Rajshahi University of Engineering and Technology
4	Engr. Asique Rahman	External Industry Member, Manager (SE), Katakhali 50MW Power Plant, BPDB, Rajshahi
5	Rezwana Sultana	Assistant Professor, Department of Electrical and Electronic Engineering, Varendra University
6	DristiDatta	Assistant Professor, Department of Electrical and Electronic Engineering, Varendra University
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9	Tamim Hossain	Lecturer, Department of Electrical and Electronic Engineering, Varendra University
10	BishalKarmakar	Lecturer, Department of Electrical and Electronic Engineering, Varendra University
11	JannatulAfrojAkhi	Lecturer, Department of Electrical and Electronic Engineering, Varendra University
12	Mst. Tasnin Tania	Lecturer, Department of Electrical and Electronic Engineering, Varendra University
13	Md. Sarwar Hosen	Lecturer, Department of Electrical and Electronic Engineering, Varendra University
14	Md. FatinIshraque	Lecturer, Department of Electrical and Electronic Engineering, Varendra University
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Department of Electrical and Electronic Engineering (EEE)

B.Sc. in Electrical and Electronic Engineering

The Department of Electrical and Electronic Engineering at Varendra University (VU) will be offering four-year undergraduate degree program in Electrical and Electronic Engineering. The bachelor degree program requires 152 credits and is spread over 12 semesters with 3 semesters per year.

The aim of the degree program is to keep the students well equipped with the theoretical and practical knowledge of the particular branch. The Electrical and Electronic Engineering program is designed to produce graduates who will find themselves fit to practice electrical engineering in the following areas: Communications, Control Systems, Power Electronics and Power systems; define and diagnose problems, provide and implement electrical engineering solutions in the industry, business and government; observe engineering ethics in the practice of electrical engineering; communicate effectively with technically diverse audiences; collaborate with others as a member or as a leader in an engineering team; develop their knowledge and keep abreast of the advancements in electrical, electronic and telecommunication engineering.

The department has already developed its own laboratories in Electrical Circuits, Analog and Digital Electronics, Microprocessors, Electrical Machines, Communication Engineering and Control Systems.

The Credit Hour System

The procedure of Credit Hour Semester System which will be practiced in the academic program at the Varendra University involves 13 weeks of class room instructions in each semester. For all 3 credit theory and 1.50 credit Lab courses, contact hour is 3 period/week. Each class period of theory/Lab courses will have a minimum duration of 50 minutes.

The Semester System and Semester Schedule

An academic year comprises three semesters, each semester spanning 4 months: 13 weeks for instruction and 3 weeks for registration and examinations. Semester starts at January (Spring Semester), May (Summer Semester) and September (Fall Semester).

Type of Courses

The courses of the undergraduate curricula are divided into several groups:

1. General Education Courses
2. Basic Science Courses
3. Mathematics Courses
4. EEE Core Courses
5. Interdisciplinary Courses
6. Technical Elective Courses

Earned Credits

The course in which a student obtains ‘D’ or higher grade will be counted as credit earned by the student. ‘F’ grade is not counted towards a student’s earned credits. A student who obtains an ‘F’ grade in any core course has to repeat the course. If a student obtains an ‘F’ grade in an optional course,

he/she may choose to repeat the course or take a substitute course if available. 'F' grade is not counted for GPA calculations but will show on the Grade Sheet and Transcript. Students can appear in the supplementary examination to improve their grades. However, a student is permitted to appear in supplementary examinations not more than twice for a course and his/her credit is determined by averaging the marks obtained in the supplementary and original examination.

The Evaluation Procedures

Evaluation of students' performance will be based on final examination, midterm examination, class-test/assignments and attendance. Classroom evaluation including attendance, class tests and assignments will cover 30% of the total marks and the remaining 70% are reserved for the midterm and final examinations. For Lab courses evaluation will be based on attendance, Lab assessment, Lab report, Quiz and Viva. The distribution of marks is as follows:

Theory course:

Attendance	10%
Class test/Assignment	20%
Midterm Examination	30%
Final Examination	40%

Lab course:

Attendance	10%
Lab Assessment	20%
Report	20%
Quiz/Project	30%
Viva	20%

Grading and Point System

Numerical Grade	Letter Grade	Grade Point
80 % and above	A+ (A Plus)	4.00
75% to less than 80 %	A (A Regular)	3.75
70 % to less than 75%	A- (A Minus)	3.50
65% to less than 70%	B+ (B Plus)	3.25
60% to less than 65%	B (B Regular)	3.00
55% to less than 60%	B- (B Minus)	2.75
50% to less than 55%	C+ (C Plus)	2.50
45% to less than 50%	C (C Regular)	2.25
40% to less than 45%	D	2.00
Less than 40%	F	0.00
Continuation for Thesis/Project	X	---

Note: If Letter Grade 'I' (Incomplete) is awarded to any student in any course, it will indicate that he/she has attended the course but did not appear in the semester midterm/final examination. Letter Grade 'W' indicates withdrawn from the course.

Cumulative Grade Point Average

Student's performance will be evaluated on the basis of Grade Point Average (GPA) semester wise and Cumulative Grade Point Average (CGPA) of total completed courses.

The CGPA will be computed in the following manner:

$$\text{CGPA} = \frac{\sum Grade\ Points \times Credits}{\sum Credits}$$

Admission Requirements

The minimum qualifications for admission into the undergraduate program are:

1. Academic Qualifications:

   At least second division in both SSC and HSC (No third division is acceptable) or Minimum 2.5 GPA out of 5.00 in both S.S.C. and H.S.C. Student should be from Science background with Math and Physics.

   O-Level and A-Level:

   Five subjects in University of London GCE O-level and three major subjects (Math, Physics and Chemistry) in A-level are required. Minimum average GPA of combined O-level and A-level is 3 (Grade C), according to the VU scale: A=5, B=4, C=3, D=2 & E=l
2. A US high school diploma or equivalent.
3. Acceptable scores in VU VIVA Test.

Degree Requirements

The degree requirements of Bachelor of Science degree in Electrical and Electronic Engineering are:

1. Completion of 152 credit hour courses
2. Passing of all courses individually and maintaining a minimum CGPA of 2.00

List of Courses

1. General Education: (Have to take all the courses).

No. of Courses: 4 (Theory: 4, Lab: 0)

Total Credits: 12(Theory: 12, Lab: 0)

Sl. No	Course Code	Course Title	Credit	Pre-requisite
01	ENG111	English Fundamentals	2.00	
03	HUM 211	Economicsand Accountancy	3.00	
04	BAN 231	History of Emergence of Bangladesh	3.00	

05	HUM311	Industrial Management	3.00	

2. Basic Science: (Have to take all the courses)

No. of Courses: 4(Theory: 2, Lab: 2)

Total Credits: 7.00 (Theory: 5, Lab: 2)

Sl. No	Course Code	Course Title	Credit	Pre-requisite
01	CHEM 111	Chemistry	2.00	
02	CHEM 112	Chemistry Lab	1.00	
03	PHY121	Physics	3.00	
04	PHY122	Physics Lab	1.00	

3. Mathematics: (Have to take all the courses)

No. of Courses: 5 (Theory: 5, Lab: 0)

Total Credits: 15 (Theory: 15, Lab: 0)

Sl. No	Course Code	Course Title	Credit	Pre-requisite
01	MAT111	Differential and Integral Calculus	3.00	
02	MAT121	Coordinate Geometry & Vector Analysis	3.00	MAT-111
03	MAT131	Differential Equations and Matrices	3.00	MAT-121
04	MAT211	Fourier and Laplace Analysis	3.00	MAT-121
05	MAT221	Complex Variables and Statistical Analysis	3.00	

4. EEE Core Courses: (Have to take all the courses)

No. of Courses: 40 (Theory: 21, Lab: 20)

Total Credits: 91.5(Theory: 63, Lab: 29.5)

Sl. No	Course Code	Course Title	Credit	Pre-requisite
01	EEE111	Electrical Circuits I	3.00	
02	EEE112	Electrical Circuits I Lab	1.50	
03	EEE121	Electrical Circuits II	3.00	EEE-111

Sl. No	Course Code	Course Title	Credit	Pre-requisite
04	EEE122	Electrical Circuits II Lab	1.50	
05	EEE123	Electronics I	3.00	
06	EEE124	Electronics I Lab	1.50	
07	EEE 131	Electronics II	3.00	EEE-123
08	EEE 132	Electronics II Lab	1.50	
09	EEE213	Electrical Machines I	3.00	
10	EEE214	Electrical Machines I Lab	1.50	
11	EEE 216	Circuit Simulation Lab	1.00	
12	EEE221	Electrical Machines II	3.00	EEE-213
13	EEE222	Electrical Machines II Lab	1.50	
14	EEE223	Numerical Techniques for Engineers	3.00	
15	EEE 224	Numerical Techniques for Engineers Lab	1.50	
16	EEE 233	Digital Electronics	3.00	EEE123
17	EEE 234	Digital Electronics Lab	1.50	
18	EEE 236	Electronic Workshop	1.00	
19	EEE311	Signals and Systems	3.00	
20	EEE313	Electrical & Electronic Measurement	3.00	
21	EEE314	Electrical & Electronic Measurement Lab	1.50	
22	EEE 316	Electrical Services Design Lab	1.50	CE 124
23	EEE321	Transmission & Distribution of Electrical Power	3.00	
24	EEE323	Power Electronics	3.00	EEE 131
25	EEE324	Power Electronics Lab	1.50	
26	EEE325	Digital Signal Processing	3.00	EEE311
27	EEE326	Digital Signal Processing Lab	1.50	
28	EEE331	Electromagnetic Fields & Waves	3.00	PHY 111
29	EEE 333	Communication Engineering I	3.00	
30	EEE 334	Communication Engineering I Lab	1.50	

Sl. No	Course Code	Course Title	Credit	Pre-requisite
31	EEE335	Microprocessors & Interfacing	3.00	
32	EEE336	Microprocessors & Interfacing Lab	1.50	
33	EEE411	Power System Analysis	3.00	
34	EEE 412	Power System Analysis Lab	1.50	
35	EEE 413	Switch Gear & Protection	3.00	
36	EEE 414	Switch Gear & Protection Lab	1.50	
37	EEE 415	Control System	3.00	EEE311
38	EEE 416	Control System Lab	1.50	
39	EEE 421	Electroncs III	3.00	
40	EEE 422	Electroncs III Lab	1.50	
41	EEE425	Power Plant Engineering	3.00	

5. Technical Elective Theory Courses: (Have to take one course from each group)

No. of Courses: 4 (Theory: 3, Lab: 1.50)

Total Credits: 10.50(Theory: 9, Lab: 1.50)

Elective Course I:

Sl. No	Course Code	Course Title	Credit	Pre-requisite
01	EEE441	High Voltage Engineering	3.00	
02	EEE443	Power System Operation & Control	3.00	
03	EEE445	Power System Protection	3.00	
04	EEE447	Power System Reliability	3.00	

Elective Course II:

Sl. No	Course Code	Course Title	Credit	Pre-requisite
05	EEE 451	Solid State Devices	3.00	
06	EEE453	VLSI Design	3.00	

Sl. No	Course Code	Course Title	Credit	Pre-requisite
07	EEE455	Optoelectronics	3.00	
08	EEE 457	Biomedical Engineering	3.00	

Elective Course III:

Sl. No	Course Code	Course Title	Credit	Pre-requisite
09	EEE461	Optical Fibre Communication	3.00	
10	EEE462	Optical Fibre Communication Lab	1.50	
11	EEE463	Data Communication & Computer Networks	3.00	
12	EEE464	Data Communication & Computer Networks Lab	1.50	
13	EEE465	Microwave Engineering	3.00	
14	EEE466	Microwave Engineering Lab	1.50	

6. Inter-disciplinary Courses:

No. of Courses: 5 (Theory: 2, Lab: 3)

Total Credits: 10.50 (Theory: 6, Lab: 4.50)

Sl. No	Course Code	Course Title	Credit	Pre-requisite
01	CE112	Engineering Drawing Lab	1.00	
02	CSE 133	Computer Programming	3.00	
03	CSE 134	Computer Programming Lab	1.50	
04	ME231	Basic Mechanical Engineering	3.00	
05	ME232	Basic Mechanical Engineering Lab	1.50	

7. Thesis / Project (EEE 400, credit: 6)

All students will be required to undertake supervised study and research culminating in a dissertation in their field of specialization. The completed dissertation should be bound and printed in accordance with the regulation of the University.

8.Industrial Attachment (EEE 430 , credit: 1)

Total Credits: 152 (Theory: 109,Lab: 43 including Thesis/Project)

Ratio between Theory and Lab: 2.53:1

Twelve Semester Course Sequence

1st Year 1st Semester

Course Code	Course Title	Credits	Pre-requisite
MAT 111	Differential and Integral Calculus	3.00	
ENG111	English Fundamentals	2.00	
CHEM 111	Chemistry	2.00	
CHEM 112	Chemistry Lab	1.00	
EEE 111	Electrical Circuits I	3.00	
EEE112	Electrical Circuits I Lab	1.50	
CE 112	Engineering Drawing Lab	1.00	
	Total	**13.5**	

Total Credits: 13.50 No. of Theory Courses: 4

Contact Hours/week: 10 (T) + 7 (L) No. of Lab Courses: 3

1st Year 2nd Semester

Course Code	Course Title	Credits	Pre-requisite
MAT 121	Coordinate Geometry & Vector Analysis	3.00	MAT 111
EEE 121	Electrical Circuits II	3 .00	EEE111
EEE 122	Electrical Circuits II Lab	1.50	
EEE 123	Electronics I	3.00	
EEE 124	Electronics I Lab	1.50	
PHY 121	Physics	3.00	

PHY 122	Physics Lab	1.00	
	Total	**16.00**	

Total Credits: 16.00 No. of Theory Courses: 4

Contact Hours/week: 12 (T) +8 (L) No. of Lab Courses: 3

1st Year 3rd Semester

Course Code	Course Title	Credits	Pre-requisite
MAT 131	Differential Equations and Matrices	3.00	MAT 121
EEE131	Electronics II	3.00	
EEE132	Electronics II Lab	1.50	
CSE 133	Computer Programming	3.00	
CSE 134	Computer Programming Lab	1.50	
	Total	**12.00**	

Total Credits: 12.00 No. of Theory Courses: 3

Contact Hours/week: 9 (T) + 6 (L) No. of Lab Courses: 2

2nd Year 1st Semester

Course Code	Course Title	Credits	Pre-requisite
MAT 211	Fourier and Laplace Analysis	3.00	MAT - 121
EEE 213	Electrical Machines I	3.00	
EEE 214	Electrical Machines I Lab	1.50	
EEE 216	Circuit Simulation Lab	1.00	
HUM 211	Economics and Accountancy	3.00	
	Total	**11.50**	

Total Credits: 11.50 No. of Theory Courses: 3

Contact Hours/week: 9 (T) + 6(L) No. of Lab Courses: 2

2nd Year 2nd Semester

Course Code	Course Title	Credits	Pre-requisite
MAT221	Complex Variables and Statistical Analysis	3.00	
EEE 221	Electrical Machines II	3.00	EEE213
EEE 222	Electrical Machines II Lab	1.50	
EEE223	Numerical Techniques for Engineers	3.00	
EEE 224	Numerical Techniques for Engineers Lab	1.50	
	Total	**12.00**	

Total Credits: 12.00 No. of Theory Courses: 3

Contact Hours/week: 9 (T) + 6 (L) No. of Lab Courses: 2

2nd Year 3rd Semester

Course Code	Course Title	Credits	Pre-requisite
ME 231	Basic Mechanical Engineering	3.00	
ME 232	Basic Mechanical Engineering Lab	1.50	
BAN 231	History of Emergence of Bangladesh	3.00	
EEE 233	Digital Electronics	3.00	EEE 123
EEE 234	Digital Electronics Lab	1.50	
EEE 236	Electronic Workshop	1.00	
	Total	**13.00**	

Total Credits:13.00 No. of Theory Courses: 3

Contact Hours/week: 9 (T) + 8 (L) No. of Lab Courses: 3

3rd Year 1st Semester

Course Code	Course Title	Credits	Pre-requisite
HUM 311	Industrial Management	3.00	
EEE 311	Signals and Systems	3.00	
EEE 313	Electrical & Electronic Measurement	3.00	
EEE 314	Electrical & Electronic Measurement Lab	1.50	
EEE 316	Electrical Services Design Lab	1.50	
	Total	**12.00**	

Total Credits: 11.50 No. of Theory Courses: 3

Contact Hours/week: 9 (T) + 5 (L) No. of Lab Courses: 2

3rd Year 2nd Semester

Course Code	Course Title	Credits	Pre-requisite
EEE 321	Transmission & Distribution of Electrical Power	3.00	
EEE 323	Power Electronics	3.00	EEE 123
EEE 324	Power Electronics Lab	1.50	
EEE325	Digital Signal Processing	3.00	EEE 311
EEE326	Digital Signal Processing Lab	1.50	
	Total	**12.00**	

Total Credits: 12.00 No. of Theory Courses: 3

Contact Hours/week: 9 (T) + 6 (L) No. of Lab Courses: 2

3rd Year 3rd Semester

Course Code	Course Title	Credits	Pre-requisite
EEE 331	Electromagnetic Fields & Waves	3.00	
EEE333	Communication Engineering I	3 .00	
EEE 334	Communication Engineering I	1.50	

	Lab		
EEE335	Microprocessors & Interfacing	3.00	
EEE336	Microprocessors & Interfacing Lab	1.50	
	Total	**12.00**	

Total Credits: 12.00
Contact Hours/week: 9 (T) + 6 (L)
No. of Theory Courses: 3
No. of Lab Courses: 2

4th Year 1st Semester

Course Code	Course Title	Credits	Pre-requisite
EEE 411	Power System Analysis	3.00	
EEE 412	Power System Analysis Lab	1.50	
EEE 413	Switch Gear & Protection	3.00	
EEE 414	Switch Gear & Protection Lab	1.00	
EEE 415	Control System	3.00	EEE -311
EEE 416	Control System Lab	1.50	
EEE 410	Capstone Project Part I	1.50	
	Total	**14.50**	

Total Credits: 14.50
Contact Hours/week: 9 (T) + 12 (L)
No. of Theory Courses: 3
No. of Lab Courses: 4

4th Year 2nd Semester

Course Code	Course Title	Credits	Pre-requisite
EEE 421	Electronics III	3.00	
EEE 424	Electronics III Lab	1.50	
EEE 425	Power Plant Engineering	3.00	
	Elective Course - I	3.00	
EEE 420	Capstone Project Part II	1.50	

Total	**12.00**	

Total Credits:12.00 No. of Theory Courses: 3

Contact Hours/week: 9 (T) + 6 (L) No. of Lab Courses: 2

4th Year 3rd Semester

Course Code	Course Title	Credits	Pre-requisite
	Elective Course - II	3.00	
	Elective Course - III	3.00	
	Elective Course - III Lab	1.50	
EEE 432	Industrial Attachment	1.00	
EEE 430	Capstone Project Part II	3.00	
	Total	**11.50**	

Total Credits:11.50 No. of Theory Courses: 2

Contact Hours/week: 6 (T) + 10 (L) No. of Lab Courses: 3

Detail Syllabus

General Education

ENG 111 English Fundamentals Credit: 2.00

Grammar: Noun and pronoun, adjective (articles and determiners), verb and tense, subject-verb agreement, clause and sentence structure, making question (wh-question, yes/no questions, tag question), conjunction, preposition, active and passive voice
Reading: Reading Comprehension (scanning and skimming, summarizing, critical reasoning)
Writing: Basics of paragraph and essay writing, CV writing, cover letter, joining and resignation letter
Public Communication: Formal and informal English, spoken discourse, presentation
Recommended Books:

1. Intermediate English Grammar – Raymond Murphy
2. ABC of English Grammar – Jahurul Islam
3. Houghton Miffin English Grammar and Composition - Anne Cole Brown
4. Exercises in Reading Comprehension - E.L. Tibbitts

5. A Handbook of Paragraph Writing – Jahurul Islam
6. From Paragraph to Essay – Maurice Imhoof and Herman Hudson
7. How to Write First Class Business Correspondence – L. Sue Baugh, Maridell Fryer and David A. Thomas
8. Model Business Letters, Emails and other documents – Shirley Taylor
9. Function in English – Jon Blundell, Jonathan Higgens and Nigel Middlemiss
10. A course in Listening and Speaking I & II – V. Sasikumar, P. KiranmaiDutt and GeethaRajeevan

HUM 211 Economics and Accountancy Credit: 3.00

Economics:Definition, scope and methods. Demand, supply and their elasticity's; equilibrium analysis-partial and general; Consumer behavior, marginal utility; indifference curve, consumer's surplus; producer behavior; iso-quant, iso-cost line. Factors of production function; production possibility curve; fixed cost and variable cost; short run and long run costs, total, average and marginal cost; laws of returns; internal and external economics and diseconomies; market and market forms; perfect and imperfect competition; price output determinations. Introductory ideas on GNP, GDP, perceptual income, interest, rent, saving, investment, inflation; Project approval, NPV, IRR & their application, cost benefit analysis.

Accountancy:Definition, advantages, objects; Nature of transaction; double-entry system of book-keeping; classification of account.Accounting cycle: Journal, ledger, trial balance, final account including adjustment.Final Accounts: Trading & manufacturing accounts, profit and loss accounts and balance sheet. Depreciation:Methods of depreciation. Costing: Concept of cost, classification of cost, cost-sheet, distribution of overhead to the various cost centre/departments, calculation of departmental overhead rate and machine hour rate; job costing: preparation of job cost-sheet & quotation. Marginal costing & profit volume/ratio, operating cost.

Text Book:

1. Economics: Samuelson &Naurdhaus.
2. Principle of Accounting: Needles & Anderson

Reference Book:

1. Macro Economics:Shaum's
2. Financial Accounting: Weggandt&Kieso

BAN 231 History of Emergence of Bangladesh Credit: 3.00

A brief survey of socio-political condition of pre-partition India since 1905, Partition of India in 1947, Language Movement, Political parties and political personalities, Disparity between two wings of Pakistan, Military rule of Ayub Khan (1958-1969), The Six-point Movement, Mass Upsurge of 1969 and fall of Ayub Khan, Military rule of 1969 and Yehiya Khan, General election of 1970, The historic speech of 7 March by Bangabandhu Shaikh Mojibur Rahman and Non-Cooperation Movement, Genocide of 25 March, Mujibnagar Government, the beginning of Liberation War and the emergence of Bangladesh, Surrender of arms by the 'MuktiBahine' and withdrawal of Indian forces, Constitution of Bangladesh.

Books Recommended:

1. **K.B. Sayeed, *Political System of Pakistan*.**
2. **ড. মো. মাহবুবররহমান, *বাংলাদেশেরইতিহাস, ১৯৪৭-১৯৭১*।**

3. বশিরআল হেলাল, *ভাষা আন্দোলনেরইতিহাস*।
4. আতিউররহমান, *মুক্তিযুদ্ধেরপ্রস্তুতিপর্ব : অসহযোগেরদিনগুলি*।
5. অমুলেন্দু দে, *স্বাধীন বঙ্গভূমি গঠনেরপ্রয়াস ও পরিণতি*।
6. সিরাজুলইসলাম (সম্পা.), *বাংলাদেশেরইতিহাস, ১৭০৭-১৯৭১*, ১ম, ২য় ও ৩য় খন্ড।
7. আবুলমালআব্দুলমুহিত, *বাংলাদেশ : জাতিরাষ্ট্রের উদ্ভব*।
8. সৈয়দ আনোয়ার হোসেন, *বাংলাদেশেরঅভ্যুদয়ে পরাশক্তির ভূমিকা*।

HUM311 Industrial Management Credit: 3.00

Management Functions and Organization: Evolution, management function: organization, theory and structure, span of control, authority delegation, manpower planning.

Personal Management: Importance, need hierarchy, motivation, leadership, wage incentives, performance appraisal, and participative management.

Operation Management: Production planning and control (PPC) functions, quantitative methods applied in production, quality management, location and layout planning safety and loss management.

Cost and Financial Management: Elements of cost products, cost analysis, investment analysis, and benefit cost analysis, risk analysis.

Management Accounting: Cost planning and control, budget and budgetary control.

Marketing Management: Concepts, strategy, sales promotion, patent laws.

Technology Management: Management of innovation and changes, technology life cycle.

Text Book:

Management: Mary Coulter and S. P. Robins

Reference Book:

Fundamentals of Management: Ricky W. Griffin

Basic Science

CHEM 111 Chemistry Credit 2.00

Course Content

Different types of chemical bonds and their properties. Modern concepts of acids and bases. Problems involving acid base titration. Properties and uses of noble gases. Electrochemistry, Mechanism of electrolytic conduction, Transport number, Kohl-Rausch's law. Ionization of water and concept of pH . Different types of cells, Cell emf. Single electrode potentials, their determination and application. Secondary Cells or Accumulators, lead accumulator 25 and alkaline accumulator. Different types of solutions. Factors influencing the solubility of a substance, solution of gas in liguids. Colligative properties of dilute solution. Le-chatelier's theorem and some of its important industrial applications. Thermochemistry, chemical kinetics.

CHEM 112 Chemistry LabCredit 1.00

Course Content

Laboratory experiments based on theory of course CHEM 111

PHY 121 Physics **Credit: 3.00**

Course Content

Electricity and Magnetism: Electric charge and Coulomb's law, Electric field, concept of electric flux and the Gauss's law – some applications of Gauss's law, Gauss's law in vector form, Electric potential, relation between electric field and electric potential, capacitance and dielectrics, gradient, Laplace's and Poisson's equations, current, current density, resistivity, the magnetic field, Ampere's law, Biot-Savert law and their applications, Laws of electromagnetic induction-Maxwell's equation.

Waves: Periodic Motion, Simple Harmonic Oscillation, Types of waves, Equation of waves, Velocity and energy, complex waves, Standing waves, Resonance and Beats, Sound waves, Doppler effect.

Fundamentals of light: Basic properties of and theories of light, Electromagnetic spectrum and visible range, Refractive index, optical path, Dispersion, Wave theory and Huygens principle, Photoelectric effect, Quantum theory of light, Wave-particle duality, Photons.

Interference: Interference phenomenon, Young's double slit experiment, Displacement of fringes and its uses, Fresnel's bi-prism, Interference in thin films, Newton's ring, Interferometers.

Diffraction: Fresnel and Fraunhoffer Diffraction, Diffraction by single slit, Diffraction from a circular aperture, Resolving power of optical instruments, Diffraction at double slit and N-slits, Diffraction grating.

Polarization: Production and analysis of polarized light, Brewster's law, Malus law, Polarization by reflection and refraction, Nicol prism, Optical activity, Polarimeters.

Course Objectives

The objectives of the course are to

1. Explain the basic concepts of charge and develop a clear understanding of the basic laws such as Coulomb's law and Gauss's law and apply them to solve various problems related to electrostatic charges.
2. Able to understand how magnetic field is generated around a current carrying wire and apply Biot-Savert and Ampere's law to determine the magnetic field.
3. Explain the generation of electricity while magnetic flux changing.
4. Know classification of waves and its various applications.
5. Explain the wave nature such as interference, diffraction, polarization phenomena as well as particle nature such as photoelectric effect of light.
6. Produce and analyze plane polarized light.

Required Text

Thecoursewillbebasedmostly onthefollowing books
[someotherbooksandjournalsmaybereferredtime to time]:

1. Halliday and Resnick, ***Fundamentals of Physics*****,** John Wiley & Sons, Inc.

Recommended Readings:

1. F A Jenkins and H E White, ***Textbook of optics.***
2. Brij Lal, M. N. Avadhanulu, and N. Subrahmanyam , ***A Textbook of Optics.***

PHY 122 Physics Lab Credit: 1.00

Course Content

In this course students will perform experiments to verify practically the theories and concepts learned in PHY 121.

Course Objectives

The objectives of the course are to

1. To obtain basic knowledge of laboratory equipment.
2. To determine the resistance and capacitance using color code and code respectively.
3. To solve various problems
4. To develop skill different types rectifying circuit, clipper and clamper circuit.

Required Text:

Lab manual will be supplied during the lab.

Mathematics

MAT111 Differential and Integral Calculus Credit: 3.00

Course Content

Differential Calculus: Differentiability, Differentiation and its geometrical representation. Successive differentiation of various types of function. Leibnitz's theorem, Role's, Mean value theorem, Taylor's and Maclaurin's theorem in finite and infinite forms. Divergency and Convergency of series. Functions of several independent variables, partial differentiation, Euler's theorem, Jacobian. Tangent, Normal and Curvature. Determination of maximum and minimum values of function and point of inflection.

Integral Calculus: Definition and properties of integration. Integration by the method of substitution, Integration by parts, Standard integrals, Integration by the method of successive reduction. Definite integrals, its properties and use in summing series. Walli's formulae, Improper integrals. Beta function and Gamma function. Area under a plane curve and area of a region enclosed by two curves in Cartesian and polar co-ordinates. Volumes and surface areas of solids of revolution.

CourseObjectives

The Objectives of the course are to-

1. get the conception of Differential and Integral calculus
2. calculate Differential co-efficient by various method
3. get the conception of various Differential and Integral calculus theorem
4. determine of lengths, Area and volumes using Multiple integral

Required Text:

Thecoursewillbebasedmostly onthefollowing books
[someotherbooksandjournalsmaybereferredtime to time]:

Das &Mukharjee– ***Differential Calculus***
Das &Mukharjee– ***Integral Calculus.***

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MAT121 Coordinate Geometry & Vector AnalysisCredit: 3.00

Course Content

Co-ordinate Geometry: 2-Dimensional Co-ordinate Geometry, Change of axes, Transformation of co-ordinates. Pair of straight lines, Circle, System of circles.General equation of second degree. 3-Dimensional Co-ordinate Geometry, System of co-ordinates, Distance of two points. Section formula, Projection, Direction cosines. Equations of planes and lines.

Vector Analysis: Scalars and Vectors, equality of vectors, Addition and subtraction of vectors, Multiplication of vectors by scalars. Scalar and vector products of two vectors. Differentiation and integration of vectors, line, surface and volume integrals. Gradient of a scalar function, divergence and curl of a vector function. Physical interpretation of gradient, divergence and curl. Conservative systems. Gauss's divergence theorem, Stoke's theorem and Green's theorem and their application in engineering problems.

Course Objectives

The objectives of the course are to

1. Get knowledge about co-ordinate system of two dimension and three dimension
2. Form and analysis straight line and plane
3. Analysis general second degree equation
4. Differentiate and integrate vector function.

Required Text:
The course will be based mostly on the following books [some other books and journals may be referred time to time]:

- Rahmans&Bhattacharjee–***A Text Book on Co-ordinate Geometry with Vector Calculus***
- M.R. Spiegel,***Schaum's Outline of Vector Analysis.***

Recommended Readings:

- H.K.Das-***Advanced Engineering Mathematics***.

MAT131 Differential Equations and Matrices Credit: 3.00

Course Content

Ordinary Differential Equation: Definition, Degree and order of differential equation. Formation of differential equations, Solution of first order differential equations by various methods, Solution of differential equation of first order and higher degrees. Solution of general linear equations of second and higher orders with constant co-efficient, Solution of Euler's homogeneous linear equations, Solution of differential equations in series by the method of Frobenius. Bessel's functions, Legendre's Polynomials and their properties.

Partial Differential Equation: Elimination of arbitrary constant and arbitrary function. One dimensional wave equation, twodimensional wave equation, Steady state heat flow equation, Solution of differential equation by the method based on the factorization of the operator and with initial and boundary conditions.

Matrices: Matrix algebra, Elementary transformation, Inverse by elementary transformation, Rank, Linear dependence and independence of vectors and matrices, Solution of linear equation using matrix, Vector spaces. Linear transformation, Eigen values and Eigen vectors, Cayley-Hamilton theorem.

Course Objectives
The course objectives are

1. Identifying a Differential Equation
2. Forming a Differential Equation
3. Solving Differential Equations of various types
4. Get the conception of vector space
5. Solving linear system of equations using matrices
6. Calculating the rank of a matrix.

Required Text:
Thecoursewillbebasedmostlyonthefollowing books
[someotherbooksandjournalsmaybereferredtime to time]:

- Dr. B.D Sharma,*Differential Equations–KedarNath Ram Nath*.
- Prof M.D. Abdur Rahman, *College Linear Algebra*-Nahar Book Depot and Publications.

Recommended Readings:

- **H.K.Das-** ***Engineering Mathematics***.

MAT211 Fourier and Laplace Analysis Credit: 3.00

CourseContent
Fourier analysis: Fourier series, Fourier coefficients, even and odd functions, properties of Fourier series, Convergence of Fourier series, extension of internal Fourier series, Fourier integral, sine and cosine integrals, finite Fourier transformation, series, infinite Fourier transformation, use of Fourier transformation in boundary value problems.

Laplace transform: Laplace transforms of elementary functions, properties of Laplace transform, inverse Laplace transform and its properties, convolution theorem, application of Laplace transform to solve differential equations related linear circuit and partial deferential equations.

CourseObjective
Theobjectivesofthecourse
areto

1. Solve the heat equation.
2. Expand a periodic function by a series in terms of sines and cosines.
3. Convert time domain into frequency domain and vice versa.
4. Solve initial value problem.
5. Solve electric circuit problem using Laplace transformation.

Required Text:
Thecoursewillbebasedmostly onthefollowing books
[s therbooksandjournalsmaybereferredtimto time]:
M.R. Spiegel**,*Schaum's Outline of Fourier Analysis.***
H.K.Das-***AdvancedEngineering Mathematics.***

Recommended Readings:
M.R. Spiegel**,*Schaum's Outline of Laplace Transformation.***

MAT 221 Complex Variables and Statistical Analysis Credit: 3.00

CourseContent

Complex Variable: Complex number system, General functions of a complex variable, Limits and continuity of a function of complex variable and related theorem, Complex differentiation and the Cauchy-Riemann equations, Complex integration and Cauchy's theorem, Cauchy's integral formulae and related theorems, Infinite series, Tailor's and Laurent series, Residue, The residue theorem, Contour integration.

Statistical Analysis: Frequency distribution, Measures of central tendency, Measures of dispersion, Moments, Skewness and Kurtosis, Correlation & Regression analysis. Elementary probability theory, Bayes' theorem, Mathematical Expectation, and Discrete Probability Distributions, e.g. Binomial, Poisson and Negative Binomial, Continuous Probability Distributions, e.g. Normal, Gamma, Logistic, Pareto, Log-Normal. Sampling Theory, Estimation and Hypothesis testing e.g., Z-test, t-test, F-test and Chi-square test.

CourseObjectives

Theobjectivesof thecourseareto

1. Application of complex numbers, limit, continuity, differentiation & integration of complex functions with their related theorems.
2. Analyze statistical data and frequency distribution.
3. Construct statistical chart, graphs and tables.
4. Use correlation, regression analysis, & probability theories in science and engineering.

Required Text:

Thecoursewillbebasedmostly onthefollowing books
[someotherbooksandjournalsmaybereferredtimeto time]:

- **M.R. Spiegel,*Schaum's Outline of Complex Variables*.**
- H.K.Das-***Engineering Mathematics***.

Recommended Readings:

- **M.R. Spiegel,*Schaum's Outline of Statistics*.**

EEE Core Courses

EEE111 Electrical Circuits I Credit: 3.00

Course Content

Fundamental concepts and units, Variables and parameters: Voltage, current, power, energy, independent and dependent sources, resistance.

Basic laws: Ohm's law, Kirchhoff's current and voltage laws, Joule's law.
Simple resistive circuits: Series and parallel circuits, voltage and current division, Wye-Delta transformation.

Techniques of circuit analysis: Nodal and mesh analysis including supernode and supermesh. Network theorems: Source transformation, Thevenin's, Norton's and superposition theorems with applications in circuits having independent and dependent sourcesand Maximum power transfer theorem.

Source Concept: Sources of E.M.F, primary and secondary cells. Energy storage elements: Inductors and capacitors, series & parallel combination of inductors and capacitors.

Magnetic quantities and variables: Flux, permeability and reluctance, magnetic field strength, magnetic potential, flux density, magnetization curve. Laws of magnetic circuits: Ohm's law and Ampere's circuital law. Magnetic circuits: series, parallel and series-parallel circuits.

Introduction to measuring instruments: Ammeter, voltmeter, galvanometer and wattmeter.

CourseObjectives

Theobjectivesof thecourseareto

1. Impart a basic knowledge of electrical quantities such as current, voltage, power, energy and frequency to understand the impact of technology in a global and societal context.
2. To develop an understanding of the fundamental laws and elements of electric circuits.
3. To develop the ability to apply circuit analysis to DC circuit.

Required Text:

Thecoursewillbebasedmostly onthefollowing books
[someotherbooksandjournalsmaybereferredtime to time]:

- **Fundamentals of Electric Circuits**: Charles K. Alexander and Mathew N. O. Sadiku

Recommended Readings:

- **Introductory Circuit Analysis**: Robert L. Boylestad

EEE112 Electrical Circuits I Lab Credit: 1.50

Course Content

In this course students will perform experiments to verify practically the theories and concepts learnt in EEE 111.

Course Objectives

The objectives of the course are to

1. To be able to give basic circuit connections.
2. Analyze and calculate different circuit parameters like voltages and currents in different parts of a circuit.
3. To know about different measuring devices like ammeters, voltmeters, wattmeters and multimeters.
4. To gain practical knowledge about proving different basic circuit theorems.
5. Design different circuits using provided circuit diagram.
6. To know about different types of electrical components like resistors, different types of sources and other components.
7. To be able to write lab reports in specified format.
8. To be able to work as a group member while included in a group.

EEE121 Electrical Circuits II Credit: 3.00

Course Content
Sinusoidal functions: Instantaneous current, voltage, power, effective current and voltage, average power, phasors and complex quantities, impedance, real and reactive power, power factor.

Analysis of single phase AC circuits: Series and parallel RL, RC and RLC circuits, nodal and mesh analysis, application of network theorems in AC circuits, circuits with non-sinusoidal excitations, transients in AC circuits, passive filters.

Resonance in AC circuits: Series and parallel resonance. Q-value and Bandwidth. Magnetically coupled circuits.

Analysis of three phase circuits: Three phase supply, balanced and unbalanced circuits, power calculation.

EEE122 Electrical Circuits II Lab Credit: 1.50

Course Content
Understanding Alternating voltage, Current, Impedance, power factor Average Power, Reactive power, Apparent Power, Voltage triangle ,Power triangle practically, Learning the connection of wattmeter, voltmeter, ammeter, use of capacitor, inductor, resistor etc.

Course Objectives
The objectives of this course are:
- Make students understand Alternating voltage, Current, Impedance, power factor Average Power, Reactive power, Apparent Power, Voltage triangle ,Power triangle practically
- They will be able to understand performance of Resistor, Inductor, Capacitor in practical circuit.

EEE123 Electronics I Credit: 3.00

Course Content
Introduction to Semiconductor: History of vacuum tube and modern electronics, Intrinsic and Extrinsic semiconductors, N and P type semiconductors; Mobility; Drift Velocity, Energy bands.

Semiconductor Diode: PN junction diodes and their I-V characteristics; Zener diode; Tunnel diode; Varactor diode; Photodiode and LDR; Transition & Diffusion capacitance.
Diode Circuits: Ideal rectifier concept; Half wave and Full wave rectifiers; Filters; Voltage regulators; Voltage doubler; Clippers and Clampers.

Bipolar Junction Transistors: PNP and NPN type, Transistor V-I characteristics, CE, CB, and CC configurations, Transistor action, Transistor as an amplifier, Operating point, Load line.

FET & MOSFET: Construction and classification, Principle of operation, Characteristic curves, Channel conductivity, Parameters of the FET, Effect of temperature on FET, Common source amplifier, Common drain amplifier, MOSFET.

Optoelectronic Devices: PN photodiode, Phototransistor, Solar Cell, Photoconductive Cell, Photovoltaic, Sensors, LED, LCD, Alphanumeric Display,
Photocouplers.

CourseObjectives

Theobjectivesof thecourseareto

7. Identify the unique vocabulary associated with electronics and explain the basic concepts of Semiconductor diodes such as p-n junction diode, characteristics and ammeters, DC load line, Zener diode.
8. Develop a clear understanding of the basic operation and characteristics of a diode in the no-bias, forward-bias, and reverse-bias regions.
9. Apply the basics of diode to describe the working of rectifier circuits such as Full and half wave rectifiers.
10. Sketch, explain and design the different clipper clamper circuit for given specification.
11. Draw and explain the structure of bipolar junction transistor. Explain the operation of each device in terms of junction bias voltage and charge carrier movement. Identify and explain the various current components in a transistor.
12. Describe and solve the mathematical quantity for the different configuration of BJT with proper diagram.
13. Develop a sense for the stability factors of a BJT configuration and how they affect its operation due to changes in specific characteristics and environmental changes.
14. Explain the construction and classification of FET and MOSFET.
15. Designandanalyzetheperformance ofvariouscascaded configurations with FETs and BJT amplifiers.

Required Text:

Thecoursewillbebasedmostly onthefollowing books [someotherbooksjournals and lecture notemaybereferredtime to time]:

*R. Boylestad, Electronic Devices And Circuit Theory 10th ed.***.**

Recommended Readings:

Millman and C.C. Halkias: Electronic Devices and Circuits

EEE124 Electronics I Lab Credit: 1.50

Course Content

In this course students will perform experiments to verify practically the theories and concepts learnedin EEE 123.

CourseObjectives

Theobjectivesof thecourseareto

5. To calculate and obtain different oscillators output
6. To analyze characteristics of Diodes and BJT.
7. To develop skill different types rectifying circuit, clipper and clamper circuit.

Required Text:

Lab manual will be supplied during the lab.

EEE131 Electronics II Credit: 3.00

Course Content

Low-Frequency Response of Transistor Amplifiers: Effect of emitter bypass capacitor; Effect of coupling capacitor; Cascading of CE stage; Mid-frequency gain; low-frequency response of cascaded stages; Transformer coupled amplifier

High-Frequency Response of Transistor Amplifiers: High frequency model for CE amplifier, CE short circuit current gain, High frequency current gain with resistive load, High frequency response of cascaded CE stages, Transformer coupled amplifier, Transistor noises.

Feedback: Concept of feedback: Negative feedback, Positive feedback, Voltage feedback, Current feedback, Effect of feedback on impedance, Gain, Bandwidth, Distortion & Stabilization.

Operational Amplifier: Difference amplifier, CMMR, Ideal operational amplifier, Inverting amplifier, Non-inverting amplifier, General purpose IC operational amplifier, Integrator, Differentiator, Linear and non-linear applications of operational amplifier, Comparator and Converter.

Oscillators: Positive feedback, Condition of oscillation, RC phase shift oscillator, Wein bridge oscillator, Resonant circuit oscillators, Crystal oscillator and Waveform generators.

Power Amplifiers: Classification of power amplifiers, Collector efficiency, Transformer coupled class A amplifier; Class-B push-pull amplifier, Class-C amplifier, Tuned amplifier, class D, E & S amplifier.

Course Objectives

The objectives of the course are to

1. To be able to know about Low and High-Frequency Response of Transistor Amplifiers .
2. To know about feedback and its effect.
3. To know about Op amps and different circuits using Op amps.
4. To gain knowledge about power amplifiers.

Required Text

Thecoursewillbebasedmostly onthefollowing books [someotherbooksjournals and lecture notemaybereferredtime to time]:

R. Boylestad, *Electronic Devices And Circuit Theory*

Recommended Readings:

V.K. Mehta, Rohit Mehta, *Principles of Electronics*.
Charles K. Alexander, *Fundamentals of Electric Circuits*.
Ramakant A. Gayakward, *Op-Amps and Linear Integrated Circuits*
Robert F. Coughlin, *Operational Amplifiers and Linear Integrated Circuits*

EEE132Electronic Circuits II LabCredit: 1.50

Course Content

In this course students will perform experiments to verify practically the theories and concepts learned in EEE 131.

CourseObjectives

Theobjectivesof thecourseareto

1. Understand the characteristics of different types of op-amp circuits (ex. inverting amplifier, non-inverting amplifier, integrator and differentiator circuits etc.)
2. Compare the characteristics among different comparator circuits.
3. Design different oscillator circuits

Required Text:

Lab manual will be supplied during the lab.

EEE 213 Electrical Machines I Credit: 3.00

Course Content

D.C. Generator: Principles, Construction, Classification, Armature windings, Voltage build up, Armature reactions and Commutation, Performance and testing, Compounding of d.c. generator, Generator characteristics, Voltage regulation, Losses and efficiency, Parallel operation.

D.C. Motor: Operation, Types, Back e.m.f, Torque equations, Motor characteristics, Speed-Torque Characteristics, Speed regulation, Losses and efficiency, Methods of speed control, Methods of braking, Starters,.

Single Phase Transformer: Principles, Types, Equivalent circuits, Performance and testing, Regulation, Losses and efficiency, Parallel operation, Auto-transformer, Instrument transformers.

Poly Phase Transformer: Poly phase transformer construction, Poly phase transformer connections, Harmonics in polyphase transformer, transformer cooling.

CourseObjectives

Theobjectivesof thecourseareto

4. To develop basic knowledge about the construction, characteristics, operation and application of DC machines.
5. To develop the ability to solve problems related to DC generator and motor.
6. To develop basic knowledge about the construction and operating principle of transformer.

Required Text:

Thecoursewillbebasedmostly onthefollowing books **A text book of Electrical Technology Volume II**: B. L. Theraja and A. K. Theraja

Recommended Readings:

Introductory Circuit Analysis: Robert L. Boylestad

EEE 214 Electrical Machines I Lab Credit: 1.50

Course Content

In this course students will perform experiments to verify practically the theories and concepts learned in EEE 213.

Required Text:

Lab manual will be supplied during the lab.

EEE 216 Circuit Simulation Lab Credit: 1.50

Course Content

In this course students will perform experiments to verify practically the theories and concepts learned in EEE 131.

CourseObjectives

Theobjectivesof thecourseareto

1. Understand the PSpice software in details.
2. To learn how to solve a circuit by pspice coding.
3. To learn how to design a circuit using capture student and simulate it.

Required Text:

Lab manual will be supplied during the lab.

EEE221 Electrical Machines II Credit: 3.00

Course Content

Poly phases Induction Motor: Principle of operation, Constructional details, Classifications, Equivalent circuits, Starting torque and maximum torque, Speed-torque relations, Losses and efficiency, Circle diagram, Starters, Methods of speed control, Methods of braking and plugging, Induction generator.

Synchronous Motor: Principle of operation, starting, effect of loading under different excitation, effect of changing excitation, synchronous condenser, V-curve and inverted V curve, applications.

Alternators: basic principle of operation and operational characteristics, vector diagrams at different loads, synchronous impedance, and synchronous impedance methods of predicting voltage regulation and its limitation. Parallel operation of alternators: necessary condition, synchronizing, circulating current.

Special Machines: Universal motor, Repulsion motor, Reluctance motor, Electrostatic motor, Permanent magnet motor, Hysteresis motor, Stepper motor and Power modulators, Power rectifiers and Frequency multipliers.

Generalized Energy Conversion Process: General principles of electromechanical energy conversion, Energy storage, transformation and conversion, Methods of formulation of motion equations and coordinate information, Interpretation of generalized machines from field concepts.

CourseObjectives

Theobjectivesof thecourseareto

1. Impart a basic knowledge of electrical quantities such as AC machine and Induction Machine to understand the impact of technology in a global and societal context.
2. To develop an understanding of the fundamental laws and elements of electric machines.
3. To develop the ability to apply machines to practical use.

Required Text:

Thecoursewillbebasedmostly onthefollowing books
[someotherbooksandjournalsmaybereferredtime to time]:

EEE 222 Electrical Machines II Lab Credit: 1.50

Course Content

In this course students will perform experiments to verify practically the theories and concepts learned in EEE 221.

Course Objectives

Theobjectivesof thecourseareto

1. Understand the AC machines in details.
2. To learn how to generate electricity from an Alternator.
3. To learn how to AC motor in different applications.

Required Text:

Lab manual will be supplied during the lab.

EEE 223 NumericalTechniques for EngineersCredit: 3.00

CourseContent:

Introduction, Mathematical preliminaries, Errors and their computations, A general error formulae, Related mathematics, Solution of Algebraic and Transcendental Equations using bisection method, false position method, Newton-Raphson's method, secant method, Interpolation, Errors in polynomial interpolation, Finite difference,Differences of a polynomial ,Newton's Formulae for interpolation , Interpolation with unevenly spaced points(Lagrange's Interpolation Formula),Newton's formula and Lagrange's formula related mathematics,Least Squares curve fitting, fitting procedures -Straight line ,Non linear curve fitting ,Curve fitting related mathematics,Matrices and Linear Systems of Equations, Two types Solution of linear systems, Matrix inversion method,Gauss Elimination method, Gauss - Jordan method, Related Mathematics,Solution of Linear systems - Iterative Methods, Related mathematics, Numerical Differentiation and Integration, Solution of Numerical Integration using Trapezoidal rule, Simpson's 1/3 rule, 3/8 rule, Romberg Integration, Numerical Solution of Ordinary Differential Equations ,Solution by Taylor's Series, Euler's Method, Modified Euler's Method, , RungeKutta Method.

CourseObjectives

Theobjectivesofthecoursearet
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- Students will be able to solve linear , transcendental equations by numerical techniques using computer simulations
- Students will be able to solve differential and integral equations using numerical techniques.
- Students will be able to draw curve from a set of data.
- Students will be able to use them in load flow analysis in future.

Required Text:

Thecoursewillbebasedmostlyonthefollowing books
[someotherbooksandjournalsmaybereferredtimetotime]:

- Reference Book-Introductory Methods of numerical Engineering (5th Edition)-S.Sastry

EEE 224NumericalTechniques for Engineers LabCredit: 1.50

Course Content

Laboratory experiments based on theory and concept learnt in EEE 223.

CourseObjectives

Theobjectivesof thecourseareto

1.To familiarize with MATLAB Platform.
2. To learn basic commands on MATLAB.
3. To learn how to Plot various trigonometric functions using Matlab Programming.
4. To learn how to Plot a function and its derivative.
5. To learn how to find out largest and lowest element of a given row matrix.
6. To learn how to find Trace of a given matrix.
7. To learn how to find Trace of a given matrix.
8. To learn how to multiply two matrixes.
9. To learn how to solve an equation using Bi-section method.
10. To learn how to solve an equation using false position method.
11. To learn how to solve an equation using Newton-Raphson method.
12. To learn how to solve an equation using Gauss method.

Required Text:

Lab manual will be supplied during the lab

EEE 233 Digital Electronics Credit: 3.00

Course Content

Number systems: Representation of numbers in different bases, addition and subtraction in different
bases, Complement: Subtraction using complements, binary multiplication & division.

Binary codes: Different coding system, Boolean algebra, various gates, sum of products and product of
sums, standard and canonical forms and other logical operations.

Simplification of Boolean functions: Karnaugh map method, tabular method of simplification; Implementation of logic circuit using various gates, universal gates.

Combinational logic circuit: Design procedure: Adder, subtractor, code converters, parity bit checker and magnitude comparator, analysis of different combinational circuits, encoder, decoder, multiplexer, demultiplexer, ROM, PLA and their applications.

Flip-flops: SR, JK, Master slave, T and D type flip-flops and their characteristic tables & equations; triggering of flip-flops; flip-flop, excitation table.

Sequential circuits: Introduction to sequential circuits, analysis and synthesis of synchronous and asynchronous sequential circuits.

Counters**:** Classifications, Synchronous and asynchronous counter design and analysis, ring counter, Johnson counters, ripple counter and counter with parallel load.

Registers: Classification, shift registers, circular registers and their applications and registers with parallel load.

Digital IC logic families: Brief description of TTL, DTL, RTL, ECL, I2L, MOS and CMOS logic and their characteristics, principles of operation and application.

Memory Units: Various memory devices and their interfacing.

Converters: Digital to Analog (D/A), Analog to Digital (A/D) converters, and their applications.

CourseObjectives

Theobjectivesof thecourseareto

1. To develop the knowledge on analog and digital signal.
2. To introduce with different bases, addition and subtraction in different bases, Complement: Subtraction using complements, binary multiplication & division.
3. Binary codes.
4. To use Boolean algebra, various gates, sum of products and product of sums, standard and canonical forms and other logical operations.
5. To Simplification of Boolean functions: Karnaugh map method, tabular method of simplification; Implementation of logic circuit using various gates, universal gates. Combinational logic circuit: Design procedure: Adder, subtractor, code converters, parity bit checker and magnitude comparator, analysis of different combinational circuits
6. To analysis of different combinational circuits, encoder, decoder, multiplexer, demultiplexer, ROM, PLA and their applications. Flip-flops: SR, JK, Master slave, T and D type flip-flops and their characteristic tables & equations; triggering of flip-flops; flip-flop, excitation table. Sequential circuits.

Required Text:

Thecoursewillbebasedmostly onthefollowing books
[someotherbooksandjournalsmaybereferredtime to time]:
M. Moris Mano, *Digital Logic and Computer Design.*

EEE 234 Digital Electronics Lab Credit: 1.50

Course Content

ANR, OR, NAND, NOR, XOR, XNOR , NOT etc logic gate performance analysis using Respective ICs , Full Adder, Half Adder circuit analysis, Half subtractor, Full Subtractor circuit, MUX, DEMUX, Flip-flop performance analysis.

CourseObjectives

Theobjectivesof thecourseareto

- Students will be able to simplify of Boolean expressions using standard methods.
- They will be able to solve sequential logic circuits with the acquired knowledge of flip flops
- They will be able to Design combinational and / or sequential circuits to meet the given specifications / constraints.

EEE 236 Electronic Workshop **Credit: 1.00**

In this course students will perform experiments to verify practically the theories and concepts learned in Electrical and Electronic courses.

EEE 311 Signals and Systems **Credit: 3.00**

Course Content

Classification of signals and systems: signals- classification, basic operation on signals, elementary signals, representation of signals using impulse function; systems- classification. Properties of Linear Time Invariant (LTI) systems: Linearity, causality, time invariance, memory, stability, invertibility.

Time domain analysis of LTI systems: Differential equations- system representation, order of the system, solution techniques, zero state and zero input response, system properties; impulse response- convolution integral, determination of system properties; state variable- basic concept, state equation and time domain solution.

Frequency domain analysis of LTI systems: Fourier series- properties, harmonic representation, system response, frequency response of LTI systems; Fourier transformation- properties, system transfer function, system response and distortion-less systems. Analogous systems*:* f-v and f-i analogy, Electro-mechanical systems. Applications of time and frequency domain analyses: solution of analog electrical and mechanical systems, amplitude modulation and demodulation, time-division and frequency-division multiplexing.

Laplace transformation: Fourier to Laplace, Properties, inverse transform, solution of system equations, system transfer function, system stability and frequency response and application, Convolution integral and its application, Superposition integral.

The Z Transformation: Sampled data system, Definition and properties of Z-transform, ROC, Inverse Z-transform, Mapping between Z plane and S plane, Stability, Solution of Difference equations

Course Objectives

This course is to provide students with an overview of the concepts and fundamentals of Signals and Systems. Topics to be covered include: Classification of signals and systems,

Time domain analysis of LTI systems, Frequency domain analysis of LTI systems, Laplace transformation, The Z Transformation. The objectives of the course are to

1. Be able to describe signals mathematically and understand how to perform mathematical operations on signals.
2. Be familiar with commonly used signals such as unit step, ramp, impulse function, sinusoidal signals and complex exponential.
3. Be able to classify signals and systems and understand system properties.
4. Be able to know the process of convolution between signals and also able to compute response of LTI system.
5. Know about different filter circuits as well as Fourier series and Fourier Transform and Z-Transform for different signals with different systems.
6. Develop problem solving skill and become familiar with formulating mathematical problems and analyze them from a general problem statement.

Required Textbook

1. Linear Systems and Signals, 2nd Edition, B. P. Lathi

Reference books

1. Signals and Systems, A.V. Oppenheim and A. S. Willsky.
2. Fundamentals of Signals and Systems, Benoit Boulet.
3. Digital Signal Processing, John G. Proakis.

EEE 313 Electrical & Electronic Measurement Credit: 3.00

Course Content

Measurement of resistance, inductance and capacitance, balancing procedure for A.C bridges, cable faults and localization of cable faults, magnetic measurement, ballistic galvanometers, flux meter, separation of iron losses, high voltage measurement.

Measuring instruments: Classification, operating principle of ammeters, voltmeters, wattmeter and watt-hour meters.

Introduction to instrumentation Error: Classification of error, normal law of error, guarantee of error.

Transducer: Resistive, strain gauges, thermal, magnetic, LVDT, capacitive, piezoelectric, optical, current and potential transformers.

Electronic measuring instruments: Oscilloscope, DMM, VTVM, TVM.

Computer based instrumentation: PC-based data acquisition, filtering by moving average, Instrumentation for process control, data conditioning.

Mechanical measurement: Measurement of speed, frequency, pressure, temperature, flow force, weight level detector, shaft encoder.

Course Objectives

The objectives are -

1. Explain basic concepts and definitions of measurement.
2. Describe the bridge configurations and their applications.
3. Introduce students how to use modern tools necessary for electrical projects.

Required Text Book

Measurement and Instrumentation Principles: A. S. Morris

Reference Book:

Elements of Electronic Instrumentation and Measurement: J. J. Carr

EEE 314 Electrical & Electronic Measurement Lab Credit: 1.50

Course Content

In this course students will perform experiments to verify practically the theories and concepts learned in EEE 313.

Course Objectives

Theobjectivesofthecourseare

1.To learn the use of Wattmeter and energy meter.
2. To experience the use of Ammeter-voltmeter method.
3. To know how to extend ammeter range using Shunt connection.
4. To know how to extend Voltmeter range using Multiplier.
5. To learn how to measure a turn ratio of current transformer.
6. To learn how to measure a turn ratio of potential transformer.
7. To learn how to measure total power of a system

Required Text:

Lab manual will be supplied during the lab.

EEE 316 Electrical Services Design Lab Credit: 1.50

Course Content

Understanding energy meter connection, difference between series parallel connection of practical load/ lights, studying operation of fluorescent bulb, studying various wires specifications, their connections, operating principle of practical generators, transformers, CBs. Understanding and drawing house wiring system using AutoCAD.

Course Objectives

Theobjectivesofthecourseareto

- Students will understand energy meter connection, fluorescent, incandescent bulb connection and operating principle.
- They will know various cables and wires name, rating and how to use them practically.
- They will be able to know residential house wiring.
- They will be able to use AutoCAD software. And to use it to draw residential house wiring.

Required Text:

Lab manual will be supplied during the lab.

EEE 321 Transmission & Distribution of Electrical Power Credit: 3.00

Course Content

Inductance of Transmission Lines: Flux linkages, Inductance due to internal flux, Inductance of single phase two-wire line; Flux linkage of one conductor in a group, Inductance of composite conductor lines, G.M.D. Examples, 3-phase line with equilateral and with unsymmetrical spacing, Parallel circuit 3-phase lines.

Capacitance of Transmission Lines: Electric field, Potential difference between points due to a charge, Capacitance of a two-wire line, Group of charged conductors. Capacitance of 3-phase line with equilateral and with unsymmetrical spacing, Effect of earth, Parallel circuits lines.

Resistance and Skin Effects: Resistance and temperature, Skin effects influence on resistance.

Current and voltage relation on a transmission line: Representation of line- short, medium and long transmission lines; T and π representation, Exact solution, Equivalent circuit of a long line; Generalized Line Constants; General line equation in terms of ABCD constants, Relation between constants, Charts of line constants, Constants of combined networks, Measurements of line constants.

Circle Diagrams: Receiving and sending end power circle diagrams, Power transmitted, Maximum power, Universal power circle diagrams. Voltage and power factor control in transmission systems; Tap changing transformers, On-load tap changing; Induction regulators, Moving coil regulators, Boosting transformer; Power factor control: Static condenser in series or parallel, Synchronous condensers, Ferranti effect.

Mechanical Characteristics: Transmission line Sag and Stress analysis, Wind and Ice loading, Supports at different elevations, Conditions at erection; Effect of temperature changes.

Insulator for Overhead Lines: Types of insulators and their constructions and performance, Potential distribution in a string of insulators, String efficiency, Methods of equalizing potential distribution, Special types of insulators, Testing of insulators, Corona.

Insulated Cables: Cables versus overhead lines, Insulating materials, Electrostatic stress grading, Three-core cables, Dielectric losses and heating, Modern development on oil filled and gas filled cables; Measurement of capacitances, Cable testing.

Distribution system: Radial, Ring mains and interconnections.

CourseObjectives

Theobjectivesof thecourseareto

1. Get pure knowledge about the construction and other parameters of Transmission and Distribution system of Electrical power.
2. Analyze and calculate the Resistance, Inductance and Capacitance of Transmission lines for both single and multiphase systems.
3. To know about Current and Voltage relation on a Transmission lines.
4. To gain knowledge about Circle Diagrams.
5. To learn about how Voltage and Power factors are regulated or controlled in practical T&D systems.
6. To know about Mechanical designing of T&D system and other parameters regarding this.
7. Analyze and understand how T&D system is constructed and analyzed in practical field.
8. To know about the constructional features of Insulated cables and analyze its various parameters.
9. Design and analyze Corona.
10. To know about and analyze various parameters regarding Insulators for overhead lines.

Required Text

Thecoursewillbebasedmostly onthefollowing books [someotherbooksjournals and lecture notemaybereferredtime to time]:

V.K. Mehta, Rohit Mehta, *Principles of Power Systems*.

EEE323 Power Electronics Credit: 3.00

Course Content

Power semiconductor switches and triggering devices: Power transistors, Fast recovery diodes, Thyristors, Power TRIAC, MOSFET, IGBT, GTO, UJT and DIAC-characteristics, rating, protection circuits, driver Circuits. Rectifiers: Uncontrolled and controlled single phase and three phase. Regulated power supplies: Linear-series and shunt, switching buck, buckboost, boost and Cuk regulators. AC voltage controllers: single and three phase. Choppers: Type A, B, C and D choppers, Pulse width modulation - Gating requirements. DC motor control: DC motor drives, Induction and Synchronous motor drives, Stepper motor control, Switched reluctance and brushless motor drives. Single phase cycloconverter.Inverters: Voltage and current source inverters, resonant, series inverter, PWM inverter. AC motor control. Stepper motor control. Resonance inverters. Pulse width modulation control of static converters. Introduction to resistance welding, saturable reactors and magnetic amplifiers, dielectric heating, induction heating.

Course Objectives

The objectives are as follows:

1. Demonstrate the steady state characteristics and switching properties of power diodes (general purpose diode, fast recovery diode, Schottkydiodes), power transistors (MOSFET, MOSFET, IGBTs, and SITs)and thyristors(SCR,MCT, GTO).

2. Analyze and compare the characteristics of single-phase and three-phase rectifiers of various topologies such as half wave and full wave rectifiers, multiphase star rectifiers, bridge rectifiers etc. with resistive and inductive loads.

3. Demonstrate the application of thyristors to Single Phase and Three Phase Controlled rectifiers.

4. Design the switch mode regulator circuits with specific requirements includingBuckBoost and Cuk Converter.

5. Design the dc power supplies, power conditioners and uninterruptible power supply(UPS).

6. Apply various techniques including Buck & Boost converter technique, Vienna rectifier technique to power factor correction applications.

7. Design and analyze the performance of various single-phase and three-phase PWM inverters with specific requirements, and compare the performance of various pulse width modulation (PWM) switching techniques including single pulse width modulation, multiple pulse width modulation, sinusoidal pulse width modulation, modified sinusoidal pulse width modulation, harmonic in injected modulation etc.

8. Design and analyze the performance various resonant inverters including resonant pulse inverters, Zero-Voltage switching and zero-current switching inverters, load resonant converters, resonants witch converters etc.

9. Design and analyze the performance of various series inverters and multilevel inverters.

Required Textbook

The course will be based mostly on the following books

- **M.H. Rashid, *Power Electronics– Circuit, Devices &Applications*, Pearson.**

Reference books:

- **Ned Mohan, *Power Electronics-Converters, Applications and Design*, Wiley&Sons.**

EEE324 Power Electronics Lab Credit: 1.50

Course Content

In this course students will perform experiments to verify practically the theories and concepts learned in EEE 323.

Required Text Book: According to the lab manual.

EEE325 Digital Signal Processing Credit: 3.00

Course Content

Introduction to Digital Signal Processing (DSP): Digital signals and systems: Operations in digital signal processing, the scope of DSP, analog to digital conversion, frequency Domain Effects of Sampling: Periodic repetitions in frequency domain due to sampling in time domain, recovery of continuous-time signal from its samples (reconstruction), role of anti-aliasing and reconstruction filters, examples of aliased signals (show how waveform is distorted), impulse response, finite impulse response (FIR) and infinite impulse response (IIR) of discrete-time systems, difference equation.

Discrete Transformations: Discrete Fourier series, the Discrete-Time Fourier Transform, discrete Fourier transform (DFT) and fast Fourier transform (FFT): Forward and inverse transforms; coefficient ordering; time and frequency resolution; periodic extension, zero padding and modulo-M reduction; properties of the DFT, circular convolution; Cooley-Tukey decomposition, recursive application, radix-2 FFTs , time and frequency decimation, computational complexity.

Z-Transforms: Basic Theory:background idea behind the z-transform (solution to LTI discrete-time diff. eq.), calculation of z-transform and its inverse (briefly), regions of convergence, Properties of z-transforms:role in solution of discrete-time LTI systems, convolution property and graphical interpretation of the convolution operation, z-transforms of cascaded systems, stability and causality, Realization and frequency Response:Frequency response (Magnitude and Phase), representation of LTI systems with rational polynomials, block-form implementations of a rational polynomial transfer function

Digital Filters: FIR filters- linear phase filters, specifications, design using window, optimal and frequency sampling methods; IIR filters- specifications, design using impulse invariant, bi-linear z-transformation, least-square methods, linear phase, Butterworth, Chebychev, Inverse Chebychev, Bessel and elliptic filters,finite precision effects in implementing digital filters.

Course Objectives

1. To develop the knowledge on signals used in digital signal processing
2. To introduce signals, systems, time and frequency domain concepts and the associated mathematical tools those are fundamental to all DSP techniques.
3. To use Z-Transformation in DSP
4. To use DFT and FFT in DSP
5. To provide a thorough understanding and working knowledge of design, implementation of digital filters
6. To analyse different digital filters
7. To compare different digital filters

Required Textbook

Thecoursewillbebasedmostly onthefollowing book:
John G. Proakis - *Digital Signal Processing*

EEE326 Digital Signal Processing Lab Credit: 1.50

Course Content

In this course students will perform experiments to verify practically the theories and concepts learned in EEE 325.

Course Objectives

1. Understand the handling of discrete/digital signals using MATLAB
2. Understand the basic operations of Signal processing
3. Design IIR, and FIR filters for band pass, band stop, low pass and high pass filters

Required Text

According to the lab manual.

EEE331 Electromagnetic Fields & Waves Credit: 3.00

Course Content

Vector analysis: Reviews of vector analysis.

Electrostatics: Coulomb's law and forces, Electric field intensity, Electrical flux density, Gauss's-theorem with application, Electrostatic potential, Equipotential surfaces, Boundary conditions, Method of images, Laplace's and Poisson's equations and its solutions, Energy of an electrostatic system.

Magnetostatics: Concept of magnetic field, flux density and magnetic field intensity. Faraday's law, Biot-Savart law and Ampere's law, vector magnetic potential; Energy of magnetostatic system; Mechanical forces and torque's in electrical and magnetic fields; Solutions to static field problems;

Electromagnetic fields and its radiation: Introduction to displacement current, Derivation of Maxwell's equation in different co-ordinate systems and its application. Boundary conditions for time varying systems, Retarded potentials.

The electrostatics of circuits: Circuit concepts and its derivation from the field equations. High frequency circuit concepts, Circuit impedance's, Concepts of good and perfect conductors, Depth of penetration, internal impedance, Power loss calculation, Skin effect of practical conductors.

Propagation and reflection of electromagnetic wave in unbounded media: Plane wave propagation, Polarization, Power flow and 10pointing theorem, Transmission line analogy, Reflection from conductor and conducting dielectric boundary.

Radio wave propagation: Plane wave propagation through ionosphere and ground wave propagation. Effect of earth curvature on propagation.

CourseObjectives

Theobjectivesof thecourseareto

1. Apply vector calculus to understand the behavior of static electric fields in standard configurations .

2. Apply vector calculus to understand the behavior of static magnetic fields in standard configurations .

3. Interpret the deeper meaning of the Maxwellian field equations domain of validity, and limitations.

4. Describe and analyze electromagnetic wave propagation in free-space .

5. Describe and analyze electromagnetic wave propagation in different types of medium .

Required Text
Thecoursewillbebasedmostly onthefollowing books [someotherbooksjournals and lecture notemaybereferredtime to time]:

- **MATTHEW N. O. SADIKU, Elements of Electromagnetics**

Recommended Readings:

- **David k. Cheng, Field and Wave Electromagnetics.**

EEE 333 Communication Engineering I Credit: 3.00

Course Content
Introduction of communication systems: Basic principles, fundamental elements, system limitations.

Information Theory: Information and system capacity, information transmission, entropy, continuous channel capacity, transmission through electrical network.

Analog communication: AM, FM, PM, DSB, SSB, VSB, ISB.
Radio Engineering: AM, FM, PM transmitter & receiver, super heterodyne receiver.

Digital communication: Introduction, Nyquist sampling theorem, quantization of analog system, quantization noise, PAM, PWM, PPM, PCM, LOGPCM, and systems, Digital modulations, ASK, FSK, PSK, DPSK, MSK, M-array digital modulation, QAM, QPSK, delta modulation, multi carrier modulation, line coding, frame construction, Error Probability.

Multiplexing: Space division multiplexing, frequency division multiplexing, time division multiplexing, and code division multiplexing.

Noise: Physical sources of noise, types of noise, calculation of noise, SNR & noise figure, and calculation of noise figure, noise temperature, equivalent noise resistance.

Course Objective

Theobjectivesofthecourseareto

1. Impart a basic knowledge of information theory.
2. To develop an understanding of the different modulation techniques.
3. To develop an understanding of multiplexing.

Required Text Book

Communication Systems: S. Haykin

Reference Book:

Principles of Communication Systems: Taub and Schilling

EEE 334 Communication Engineering I Lab Credit: 1.50

Course Content

In this course students will perform experiments to verify practically the theories and concepts learned in EEE 333.

CourseObjectives

Theobjectivesof thecourseareto

1. Impart a basic knowledge of components widely used in communication system.
2. To develop skill different types of modulation

Required Text

Lab manual will be supplied during the lab.

EEE335 Microprocessors & Interfacing Credit: 3.00

Course Content

Introduction to different types of Microprocessors: 8 bit, 16 bit, 32 bit and their architectures, Pin diagrams and junctions, Pentium microprocessors and Co-processors, RISK & CISC processor. EPROM and RAM (2764 and 6264), Instruction sets and assembly language programming.

Microprocessor peripherals and their interfacing: Introduction to some available microprocessor peripherals IC's and their applications such as 8251, 8253, 8254, 8255, 8257, 8259, 8279. A/D and D/A converter interfacing.

Standard for bus architectures and ports: ISA, EISA, MCA, PCI, VESA, Accelerated Graphics Port (AGP),Universal Serial Bus (USB), RS-232C, RS-423A, RS-449 and RS-366, IEEE-488 BUS and Bus system in a Multiprocessor System.

Introduction to Networking: Network architectures, Introduction to ISO reference model.

Introduction to operating system and Memory management.

Microcontroller and embedded system: Introduction to AT89C52.

Course Objectives

Theobjectivesofthecourseareto

1. Understand the basic computer system and the internal bus structure of a microprocessor system.
2. Understand the basic of 8086 microprocessor along with its features, applications and program model.
3. Analyze the functions of different registers of 8086 microprocessor
4. Analyze the function of status registers of 8086 microprocessor to observe the state of the cpu after each arithmetic operation.
5. Study the instructions set of 8086 microprocessor and write programs to solve different problems using the instructions set.
6. Study the addressing modes available in 8086 microprocessor.
7. Understand the pins and signals along with the pin diagram and functional description of each pin of 8086 microprocessor.
8. Study the basic comparative features of 80186, 80286, 80386 and 80486 microprocessor.
9. Understand the basics of interfacing.
10. Study of 8253/8254 programmable interval timer with their features, applications, advantages, functional block diagram and pin diagram with the explanation of each pin.
11. Analyze the read/write logic, control word generation format, modes of operation along with some problem solving of 8254 PIT.
12. Study of 8255 programmable peripheral interfacing with its features, applications, advantages, functional block diagram and pin diagram along with the explanation of each pin.
13. Analyze the read/write logic, control word generation format, modes of operation along with some problem solving of 8255 PPI.
14. Understand the machine code generation format and the conversion of an assembly language program into its equivalent machine code format.

Required Textbook

Thecoursewillbebasedmostly onthefollowing book:

Mohamed Rafiquzzaman, PH.D. - Microprocessors and Microcomputer-Based System Design.

EEE336 Microprocessors & Interfacing Lab Credit: 1.50

Course Content

In this course students will perform experiments to verify practically the theories and concepts learned in EEE 335.

CourseObjectives

Theobjectivesof thecourseareto

1. Understand the functions of 8086 registers and its instructions set.
2. Learn the use of instructions set in many mathematical problem solving using software simulations.
3. Learn case conversion technique as well as string display related problem solving using software simulation.
4. Learn how 8086 microprocessor kit can be used in some known problem solving.

Required Text

Lab manual and required software will be provided during the lab.

EEE411 Power System Analysis Credit: 3.00

Course Content

Power network representations: P.U method of performance calculation, P.U. impedance of three winding transformers, Power flow in simple systems, Load flow studies of large systems using the Gauss-Seidel methods; Control of voltage, power and reactive power; Symmetrical three phase faults on synchronous machine, Symmetrical Components: Sequence impedance and sequence networks of generators, transformers and lines, sequence network of systems, Unsymmetrical Faults: Single line to ground fault, line to line fault, double line to ground fault.

Recent trends in transmission system: Overview of flexible ac transmission system (FACTS), high voltage dc transmission system (HVDC) and SCADA.

Power system stability: The stability problem of power system, distinction between steady state and transient stability, the swing equation, equal area criterion and its applications, solution of swing equation, factors affecting transient stability, improving stability.

CourseObjectives

Theobjectivesof thecourseareto

1. Analysis of power systems subject to symmetrical and unsymmetrical faults.
2. Formulate the power flow problem and develop a solution algorithm using both the Gauss-Seidel and the Newton-Raphson methods.
3. Study of different type of fault occurred in power system.

4. Develop and solve the positive, negative, and zero sequence networks for systems consisting of machines, transmission lines and transformers.
5. Understand the models for generators during a fault and be able to use the models to calculate the fault current at any point in time for a fault applied to the terminal of a generator.
6. Develop the swing equation and understand the concept of power system stability.

Required Text
Thecoursewillbebasedmostly onthefollowing books [someotherbooksjournals and lecture notemaybereferredtime to time]:
Element of Power System Analysis 4th Edition (Stevenson)

EEE412 Power System Analysis Lab **Credit : 1.50**

Course Content

In this course students will perform experiments to verify practically the theories and concepts learned in EEE 411.

CourseObjectives

Theobjectivesof thecourseareto
1. To develop skill about per unit system.
2. To learn how to calculate instantaneous current and power using MATLAB.
3. To learn how to calculate bus admittance matrix of a specific circuit using MATLAB.
4. To learn how to apply reduction bus admittance Matrix method using MATLAB.
5. To learn how to convert Unsymmetrical Phasors into Symmetrical Components using MATLAB.
6. To learn how to apply Newton Raphson Method.

Required Text
Lab manual will be supplied during the lab.

EEE 413 Switchgear & Protection **Credit: 3.00**

Course Content

Switchgear , Essential features of switchgear, switchgear equipments, Bus-Bar arrangements, Switchgear accommodation ,Short-circuit, short-circuit currents, Faults in a Power system, Fuses, Desirable characteristics of Fuse element, Fuse element materials, Important Terms, Low Voltage Fuses, Low Voltage fuses, High Voltage Fuses, Current carrying capacity calculation of fuse element, protective relays, Fundamental requirements of protective relays, Basic relays, Electromagnetic attraction Relays, Induction Relays, Relay timing , Important terms, Time/P.S.M. curve, Calculation of relay operating time, Relay types, Induction type non-directional and directional over current relay, directional power relay, Distance or impedance relay, differential relay ,Voltage balance Differential relay, Translay system, Circuit Breakers , operating principle of circuit breakers, Arc. Phenomenon, Arc extinction principles and methods,

Important terms, types of C.B.s, O.C.B., Air Blast C.B., Sf_6 C.B., Vacuum C.B., Switchgear components, Problems of circuit interruption ,Resistance switching, Circuit Breaker rating, Related mathematical problems, Protection of Alternators and Transformers, various protections of alternators, Differential protection of alternators, Interturn protection, related math, Various protections of Transformer, Protection of Bus bars and lines.

Course Objectives

Theobjectivesare

1. To make students able to explain the necessity of switchgear in Power System.
2. Students will be able to differentiate various switchgear components.
3. They will be able to analyze operation of various types of circuit breakers.
4. They will be able to apply the knowledge in choosing protection scheme for Power System.
5. They will be able to design 11KV S/S protection scheme.

Text Book

Switchgear and protection: Theory, practice and solved problems by S. S Rao

Reference Book:

Principles of Power System By V.K. Mehta.

EEE 414 Switchgear & Protection Lab Credit: 1.50

In this course students will perform experiments to verify practically the theories and concepts learned in EEE 413.

EEE 415 Control System Credit: 3.00

Course Content

Introduction to control system: Conventional control systems, open loop versus closed loop feedback control system, input output relationship, Mathematical modeling of physical systems, block diagrams, DC machine dynamics, transient response, performance criteria, steady state response to step, ramp, and parabolic inputs, poles and zeros, frequency response from pole-zero diagram, Routh's stability criterion; canonical forms, transfer functions and signal flow graph.

Modern control system: Introduction, state variable analysis, controllability and observability, application of Eigen value, linear control system design by state feedback, SFG to state variable, transfer function to state variable and state variable to transfer function.

Stability of control system: Routh-Harzwith criterion, root locus technique, bode plot, Nyquist method, frequency response analysis, Nicholes chart, compensation.

Controller design: On-off, fuzzy, P, PI, PD and PID types, microprocessor control, introduction to programmable logic controllers (PLC), temperature control system, position control system.

CourseObjectives

Theobjectivesof thecourseareto
1. Impart a basic knowledge of control system to understand the impact of technology in a global and societal context.
2. To develop an understanding of the fundamental laws and elements of control machines.
3. To develop the ability to apply controller to make the unstable plant stable.

Required Text:
Thecoursewillbebasedmostly onthefollowing books
[someotherbooksandjournalsmaybereferredtime to time]:
- **Automatic Control System** by S Hasan Saeed

Recommended Readings:
- **Control System**: Norman S. Nice

EEE 416 Control System Lab Credit: 1.50

Course Content

In this course students will perform experiments to verify practically the theories and concepts learned in EEE 415.

Required Text: According to the lab manual.

EEE 400 Capstone Project Credit: 6.00

A project course will be assigned to the students in 4th year 1st semester and it will continue till 4th year 3rd semester. The objective is to provide an opportunity to the students to develop initiative, creative ability, confidence and engineering judgement. The result of thev work should be submitted in the form of a dissettation, which should include appropriate references, designs, logical aspects and economical aspects of their design and it's impact on economy, society and envoronment . Final assessment of this course will be done in 4th year 3rd semester.

EEE 421 Electronics III Credit: 3.00

Course Content

Frequency Response of Amplifiers: Poles, Zeros and Bode plots. Amplifier transfer function techniques of determining 3 dB frequency of amplifier circuits, frequency response of single stage and cascade amplifiers, frequency response of differential amplifiers.

Power Amplifiers: classification of power amplifiers, collector efficiency, Transformer coupled class A amplifier; class B push-pull amplifier, class –C amplifier, Tuned amplifier, class D, E and S amplifier.

Negative Resistance Devices and Switching Circuits: General characteristics of negative resistance devices, tunnel diode, two terminal and three terminal negative resistance devices, negative resistance switching circuits.
Multivibratiors: Introduction to the multivibrator, Biastablemultivibratior, Monostablemultivibrator ,Astable and other forms of multivibrator, uses of multivibrator.

Timing Circuits: Basics of IC 555, Bi-stable, mono stable and Astablemultibibrators using IC 555, Schimtt's Trigger, application of OP-Amp in timing circuits.

Active Filters; Filter fundamentals, different types of filters and specifications, active filters, transfer functions, realization of first and second order low, high and band pass filters using OP-Amps.

Course Objectives

The objectives of the course are

1. To be able to find frequency responses of different circuits.
2. Analyze and calculate the frequency responses of different amplifier circuits (single stage and cascaded).
3. To know about different classifications of power amplifiers and be able to design different amplifier circuits using power amplifiers.
4. To gain knowledge about negative resistance devices and different switching circuits.
5.Design different circuits using negative resistance property and analyze their characteristics
6. To know about different types of Multivibrator circuits using different components like BJT and Op-amp.7.Designandanalyze Multivibrator circuit using BJT, Op-amp and IC 555.
8. To know about IC 555 and to analyze its construction and usage.
9. Design and analyze various circuits using IC 555.
10. To know about IC 555 and to analyze its construction and usage.
11. To design Op amp based timing circuits and design and analyze Op-amp based different types of active filters.

Required Text:
The course will be based mostly on the following books [some other books journals and lecture note may be referred time to time]:

R. Boylestad, *Electronic Devices And Circuit Theory*

Recommended Readings:

- M.H. Rashid, *Microelectric Circuits*.
- Jacob Millman et al., *Pulse, Digital & Switching Waveforms*.
- V.K. Mehta, Rohit Mehta, *Principles of Electronics*.
- Charles K. Alexander, *Fundamentals of Electric Circuits*.
- Ramakant A. Gayakward, *Op-Amps and Linear Integrated Circuits*

- Robert F. Coughlin, *Operational Amplifiers and Linear Integrated Circuits*

EEE 422 Electronics III Lab Credit: 1.50

Course Content

In this course students will perform experiments to verify practically the theories and concepts learned in EEE 421.

Required Text : According to the lab manual.

EEE 425 Power Plant Engineering Credit: 3.00

Course Content

Introduction to thermal, hydro, nuclear and magneto-hydrodynamic power stations. Nuclear reactor, rector construction and control, power reactors, central station reactors, nuclear hazards.

Variable load problems, plotting and analysis of load curves, chronological load curves and load duration curve, energy load curve and its use, load factor, capacity factor, demand factor, utilization factor, diversity factor etc. and their impact over the cost analysis of power generation and utilization, load forcasting, selection of units and plant location.

Load shearing: Base load and peak load plants, use of chronological load curves to distribute load among units.

Power plant economics: Economic operation of power plants, input-output curve, heat rate curve, incremental rate curve, use of incremental rate curve for optimum load scheduling. Transmission line loss, determination of loss co-efficient, economic conductor selection, Kelvin's law, graphical method for location of distribution systems. Tariff and tariff design, bus system, importance of power control, current limiting reactors, different types of bus system layout, forces on bus selection in case of short circuit.

Course Objectives

The objectives of the course are to :

1. Understand the importance of energy.
2. Familiarize the students about the importance of electrical energy.
3. Familiarize the students about generation of electrical energy.
4. Understand and compare sources of energy.
5. Introduce with the generating stations.
6. Compare among thermal, hydro, nuclear and magneto-hydrodynamic power stations.

7. Introduce with variable load problems.
8. Understand the plotting and analysis of load curve and its use.
9. Familiarize with load factor, capacity factor, demand factor, utilization factor, diversity factor etc.
10. Demonstrate the knowledge about the power plant economics.
11. Know about the transmission line loss and its measurement.
12. Derive the equation for finding depreciation in power station.
13. Understand different types of tariffs used in power systems.
14. Determine the economic conductor Size.
15. Understand the scheme of Bus-Bar arrangement.
16. Analyze the reactor control of short circuit current.

EEE 430 Industrial Attachment Credit: 1

Students will be attached with ane industry or any service agencies to gain practical knowledge.

Elective Course I

EEE441 High Voltage Engineering Credit: 3.00

Course Content

High voltage DC: Rectifier circuits, voltage multipliers, Van-de-Graaf and electrostatic generators. High voltage AC: Cascaded transformers and Tesla coils. Impulse voltage: Shapes, mathematical analysis, codes and standards, single and multi-stage impulse generators, tripping and control of impulse generators. Breakdown in gas, liquid and solid dielectric materials. High voltage measurements and testing. Over-voltage phenomenon and insulation coordination. Lightning and switching surges, basic insulation level, surge diverters and arresters.

Course Objectives

This course is to provide students with an overview of the concepts of high voltage engineering. Topics to be covered include: introduction to high voltage engineering, generation and measurement of different types of high voltage sources, breakdown mechanism of insulating materials used in high voltage system, testing of high voltage instruments and lightning arrester. The objectives of the course are to

1. Be familiar with different types of high voltage sources such as ac, dc, impulse and switching impulse.
2. Be able to classify high voltage and understand the properties of different high voltage sources.
3. Be able to know the process of generating high voltage dc, ac and impulse signal. Know about different filter circuits as well as Fourier series and Fourier Transform and Z-Transform for different signals with different systems.

4. Develop problem solving skill and become familiar with formulating mathematical problems and analyze them from a general problem statement.

Required Text
Thecoursewillbebasedmostly onthefollowing books [Some other files will be provided]:
C.L. Wadhwa, ***High Voltage Engineering,*** New Age International (P) Limited, Publishers.

Recommended Readings:
M S Naidu, V Kamaraju, ***High Voltage Engineering***,Tata McGraw-Hill Publishing Company Limited.

EEE443 Power System Operation & Control Credit: 3.00

Principles of power system operation: SCADA, conventional and competitive environment. Unit commitment, static security analysis, state estimation, optimal power flow, automatic generation control and dynamic security analysis, state estimation, voltage security analysis, optimal power flow, generation control, supervisory control and data acquisition, optimal power now, generation control, dynamic security analysis and ancillary services.

Text Book:

Power Generation, Operation and Control: A. J. Wood, B. F. Wollenberg and G. B. Sheblé

Reference Book:

Power System Stability and Control: L. L. Grigsby

EEE445 Power System Protection Credit: 3.00

Purpose of power system protection. Criteria for detecting faults: over current, differential current, difference of phase angles, over and under voltages, power direction, symmetrical components of current and voltages, impedance, frequency and temperature. Instrument transformers: CT and PT. Electromechanical, electronic and digital Relays: basic modules, over current, differential, distance and directional. Trip circuits. Unit protection schemes: Generator, transformer, motor, bus bar, transmission and distribution lines. Miniature circuit breakers and fuses. Circuit breakers: Principle of arc extinction, selection criteria and ratings of circuit breakers, types - air, oil, SF6 and vacuum.

Text Book:

Fundamentals of Power System Protection: Y. G. Paithankar, S. R. Bhide

Reference Book:

Power System Protection and Switchgear: Badri Ram, D. N.Vishwakarma

EEE447 Power System Reliability Credit: 3.00

Review of probability concepts. Probability distribution: Binomial, Poisson, and Normal. Reliability concepts: Failure rate, outage, mean time to failure, series and parallel systems and redundancy. Markov process. Probabilistic generation and load models. Reliability indices: Loss of load probability and loss of energy probability. Frequency and duration. Reliability evaluation techniques of single area system.

Text Book:

Power system reliability, safety, and management: Balbir S. Dhillon

Elective Course II

EEE 451 Solid State Devices Credit: 3.00

Semiconductors in equilibrium: Energy bands, intrinsic and extrinsic semiconductors, Fermi levels, electron and hole concentrations, temperature dependence of carrier concentrations and invariance of Fermi level. Carrier transport processes and excess carriers: Drift and diffusion, generation and recombination of excess carriers, built-in-field, Einstein relations, continuity and diffusion equations for holes and electrons and quasi-Fermi level. PN junction: Basic structure, equilibrium conditions, contact potential, equilibrium Fermi level, space charge, non-equilibrium condition, forward and reverse bias, carrier injection, minority and majority carrier currents, transient and AC conditions, time variation of stored charge, reverse recovery transient and capacitance. Bipolar Junction Transistor: Basic principle of pnp and npn transistors, emitter efficiency, base transport factor and current gain, diffusion equation in the base, terminal currents, coupled-diode model and charge control analysis, Ebers-Moll equations and circuit synthesis. Metal-semiconductor junction: Energy band diagram of metal semiconductor junctions, rectifying and ohmic contacts. MOS structure: MOS capacitor, energy band diagrams and flat band voltage, threshold voltage and control of threshold voltage, static C-V characteristics, qualitative theory of MOSFET operation, body effect and current-voltage relationship of a MOSFET. Junction Field-Effect-Transistor: Introduction, qualitative theory of operation, pinch-off voltage and current-voltage relationship.

Text Book:

Solid State Electronic Devices: B. G. Streetman

Reference Book:

Electronics Materials and Devices: D. K. Ferry and J. P. Bird

EEE453 VLSI Design **Credit: 3.00**

VLSI technology: Top down design approach, technology trends and design styles. Review of MOS transistor theory: Threshold voltage, body effect, I-V equations and characteristics, latch-up problems, NMOS and CMOS inverter, pass-transistor and transmission gates. CMOS circuit characteristics and performance estimation: Resistance, capacitance, rise and fall times, delay, gate transistor sizing and power consumption. CMOS circuit and logic design: Layout design rules and physical design of simple logic gates. CMOS subsystem design: Adders, multiplier and memory system, arithmetic logic unit. Basic design methodologies: full custom and semi-custom design. Programmable logic arrays (PLAs), Field programmable gate arrays (FPGA), I/O systems. VLSI testing: objectives and strategies. Introduction to VHDL Hardware description Language.

Text Book:

1.Design of VLSI System – A Practical Introduction: Linda E. M. Brackenbury
2. Basic VLSI Design: D. A. Pucknell& K. Eshraghian

Reference Book:

1. Principles of CMOS VLSI Design: Neil H. E. Weste& K. Eshraghian
2. Fundamentals of Digital Logic with Verilog Design: S. Brown & Z. Vranesic

EEE 455 Optoelectronics **Credit: 3.00**

Optical properties in semiconductor: Direct and indirect band-gap materials, radiative and non-radiative recombination, optical absorption, photo-generated excess carriers, minority carrier life time, luminescence and quantum efficiency in radiation. Properties of light: Particle and wave nature of light, polarization, interference, diffraction and blackbody radiation. Light emitting diode (LED): Principles, materials for visible and infrared LED, internal and external efficiency, loss mechanism, structure and coupling to optical fibers. Stimulated emission and light amplification: Spontaneous and stimulated emission, Einstein relations, population inversion, absorption of radiation, optical feedback and threshold conditions. Semiconductor Lasers: Population inversion in degenerate semiconductors, laser cavity, operating wavelength, threshold current density, power output, hetero-junction lasers, optical and electrical confinement. Introduction to quantum well lasers. Photo-detectors: Photoconductors, junction photo-detectors, PIN detectors, avalanche photodiodes and phototransistors. Solar cells: Solar energy and spectrum, silicon and Schottkey solar cells. Modulation of light: Phase and amplitude modulation, electro-optic effect, acousto-optic effect and magneto-optic devices. Introduction to integrated optics.

Text Book:

Optoelectronics and Photonics Principles and Practices: Kasap

Reference Book:

Semiconductor Optoelectronic Devices: P. Bhattacharya

EEE 457 Biomedical Engineering Credit: 3.00

Course Content

Physics of human body: The cell, Body fluid, Musculo-skeletal system, Respiratory system, nervous system, The circulatory system, The body as a control system, The heart, Bioelectricity, Work done by heart, blood pressure and its measurements, Membrane potentials, molecular basis of muscle contraction, basic electrical signals from the muscles.

Interaction of wave and radiation with human body: Body's detector and matter wave, speech noise, physiological effects of intense matter waves, Interaction of electromagnetic radiation on living matter, penetration of ray's into tissue.

Biological effects of ionizing radiation: Dosimetry, primary effects, Biophysical effects of whole body irradiation, radiation measurement and protection.

Biopotentials electrodes and amplifiers: Biopotential electrode, sensors, Transducers and bioelectric amplifiers, Electromagnetic interference of medical electronic equipment, Electrical activity of excitable cells, volume conductor field, functional organization of peripheral nervous system, ENG, EMG, ECG, ERG, EEG, MEG. Electro surgery generator.

Ultrasound imaging: Transducers, Absorption and attenuation of ultrasound, scan mode and scanning system, Transcutaneous doppler flow detector, flow meter, Ultrasonic blood pressure measurement.

X-ray: X-ray production, x-ray image formation and contrast, contrast types, Effects of photon energy, Area contrast, fluoroscopic imaging system, and computed tomography.

Nuclear magnetic resonance imaging: Nuclear magnetic resonance, Image characteristics, Gamma camera.

Analytical instruments: Colorimeter, pH meter, Chromatograph, Spectrophotometer, flow measurement.

Course Objectives

The course objectives are to :

1.Explain basic concepts of biomedical engineering.

2.Design, optimize and maintain biomedical systems in tune with community needs and environmental concerns.

3.Be able to develop and integrate new technologies as they emerge

Required Textbook

Thecoursewillbebasedmostly onthefollowing books (someotherbooksandjournalsmaybereferredtimeto time):

1. Essentials of anatomy and physiology by Valerie C.Scanlon
2. Biophysics concepts and mechanism by C.J.Casey

Recommended Readings:

Introduction to biomedical equipment technology by J.J Carr

Elective Course III

EEE 461 Optical Fibre Communication Credit: 3.00

Optical communication channel: Definition of an optical communication channel for data transmission. The concept of intensity modulation of the light carrier by baseband digital information signal. Advantage and disadvantages of optical fiber compared with metallic medium. Basic theory of light transmission in optical fiber waveguide. Types of optical fibers currently used for communication systems. Optical fiber propagating modes, power loss and various dispersive phenomena. Dispersion and its effect on the available fiber bandwidth. Special advanced optical fibers.

Optical transmitters and design techniques: Basic theory of optical energy and optical energy sources. Quantum efficiency of optical sources. Semiconductor optical sources-light emitting diode(LED) and LASER diode .Device characteristics –power spectra, lasing modes, dynamic response and source noise. Modulation bandwidth of optical sources. A comparison of LED vs. LASER. Design principals for LED and LASER drive circuits.

Optical receivers and design techniques: Basic theory of optical detection, quantum efficiency and responsively of optical detectors. Semiconductor photodiodes-PIN and APD photo detectors. Detector noise sources, the quantum limit. Detector bandwidth. Comparison PIN vs. APD. Optical receiver design principles. Low impedance high impedance and Tran impedance front-end receiver models.

Optical fiber data transmission: The characteristics of optical transmitters-transmitted optical power, linearity, response time and optical spectral line width. The interactive effects of the transmitter and optical fiber characteristics on the system bandwidth-length(e.g. material dispersion model noise).Optical inter symbol interference and equalization. Receiver noise, receiver sensitivity and the probability of error analysis. System performance and the bit error rate BER evaluations.

Optical networks, interfaces and protocols: The need for a optical data communication network in the presence of conventional data communication system. Conventional data communication systems. Optical fiber LANS and physical layer designs. Synchronous optical NET (SONET).The Fiber Distributed Data Interfaces (FDDI-1 and FDDI-2).FDDI topology, standards, protocols, construction and performance analysis. The role of FDDI in an extended LAN environment.

Advanced OFC systems and technologies: Coherent light wave communication systems WDM systems, multi access optical fiber networks, optical amplifiers and optical switching.

Text Book:

Optical fiber communications: John M Senior

Reference Book:

Optical Fiber Communication: G. Keiser

EEE 462 Optical Fibre Communication Lab Credit: 1.50

In this course students will perform experiments to verify practically the theories and concepts learned in EEE - 461.

EEE 463 Data Communication & Computer Networks Credit: 3.00

Course Content

Basic Concepts:
Network hardware and software, Network topologies and categories, Reference models and standards.

Principles of Computer Communications:
Physical layer: signal analysis, bandwidth and data rate, transmission media, encoding, transmission, Data link layer: framing, error control, flow control, multiple access protocols, Network layer: circuit switching, packet switching, routing, congestion control.

Standardized Networks: Ethernet, Fast Ethernet, Gigabit Ethernet, WiFi.
Network Programming: Introduction to internetworking and TCP/IP, Socket programming, Client software, Server software, concepts of Object Oriented Programming: Thread, Socket Programming: Socket Basics, Socket-based Network Concepts, Client Server Basics, Client Server Algorithm, Socket for Client, Socket for Server. Java Servlets and Servlets Architectures, RMI, Multimedia, Java Server Pages.

Course Objectives

This course is to provide students with an overview of the concepts and fundamentals of data communication and computer networks. Topics to be covered include: data communication concepts and techniques in a layered network architecture, communications switching and routing, types of communication, network congestion, network topologies, network configuration and management, network model components, layered network models (OSI reference model, TCP/IP networking architecture) and their protocols, various types of networks (LAN, MAN, WAN and Wireless networks) and their protocols network layer routing, link layer multiple access protocols, MAC addresses and Ethernet, packet switching, circuit switching and physical technologies. The objectives of the course are to

1.Build an understanding of the fundamental concepts of computer networking.
2.To understand the physical phenomenon that can be used to transmit digital information
3.Familiarize the student with the basic taxonomy and terminology of the computer networking area.
4.Introduce the student to advanced networking concepts, preparing the student for entry advanced courses in computer networking.
5.Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Required Textbook

1. Data Communications and Networking, 4th /5th Edition, Behrouz A Forouzan

Reference books:

2. Data and Computer Communications, 7th Edition, William Stallings

3. Computer Networks, 4th Edition, Tanenbaum Andrew S.
4. Larry Peterson, Bruce Davie, Computer Networks, a system approach, 4 ed., Morgan Kaufmann.

EEE 464 Data Communication & Computer Networks Lab Credit: 1.50

Course Content

In this course students will perform experiments to verify practically the theories and concepts learned in EEE 463.

CourseObjectives

Theobjectivesof thecourseareto

1. To understand the working principle of various communication protocols.
2. To know the concept of data transfer between nodes.

Required Text:

Lab manual will be supplied during the lab.

EEE 465Microwave Engineering Credit: 3.00

Microwave Tubes: Transit time effects. Velocity modulation, Klystron amplifier, multicavity Klystron amplifier, reflex Klystron oscillator, magnetron, 27test wave tube (TWT) amplifier, backward Wave Oscillator (BWO).

Transmission lines: High frequency transmission lines, smith chart, impedance matching techniques and applications.

Wave guides: Wave-guide components, cavity resonators, parallel plane, rectangular, coaxial wave-guides, antennas radiation patterns.

Antennas: Antennas & radiation, Hertzian dipole, long antennas analysis, antenna arrays, introduction to antenna array design, rhombic & slot antenna, frequency independent and log-periodic antennas, V-antenna, introduction to microstrip antenna.

Text Book:

Microwave Engineering: D. M. Pozar

Reference Book:

Fields and Waves in Communication Electronics: S. Ramo, J. R. Whinnery and T. V. Duzer

EEE 466Microwave Engineering Lab Credit: 1.50

In this course students will perform experiments to verify practically the theories and concepts learned in EEE 465.

Inter-disciplinary Courses

CE 112 Engineering Drawing Lab Credit: 1.00

Course Content

Engineering letters, Three dimentional objects 2D view drawing, AutoCAD drawing, Ground floor plan designing using AutoCAD.

CourseObjectives

Theobjectivesofthecourseareto
Students will be able to draw Engineering Letters and digits.
They will be able to draw 3D views
They will be able to Design Ground Floor Plan using AutoCAD

Required Text: Lab Manual, Internet, Lab lecture

CSE 133 Computer Programming Credit: 3.00

Course Content

Introduction to C programming: Programming Concepts; structured programming language: Data Types, operators, expressions, control structures; functions and program structures: function basics, parameter passing conventions, scope rules and storage classes, recursion; header files; preprocessor; arrays and pointers; user defined data type: structures, unions, enumeration; input and output: standard input output, formatted input and output, file access; variable length argument list; command line parameters; error handling.

Course Objectives

The course objective is to introduce students in the arithmetic way of thinking and problem solving by computers. Issues addressed in class are: the notion of algorithm, data representations, algorithm design methods, algorithmic problem solving. Students learn the fundamental principles of structured programming. Typical characteristics and mechanisms of a structured programming language are introduced and students are introduced to the design and development of structured programs in this language. C programming language is used as the course basis. Lectures are completed by lab practice where theoretical knowledge is applied in an appropriate software environment. Upon successful completion of this course, the students possess advanced knowledge, skills and competence in Structural programming that enable them and hence the objectives of the course are to

1. Understand and explain the basic design principles for algorithms.
2. Understand basic computer programming principles, distinguish them and classify them.

3. Know a substantial number of basic algorithms and use them in problem solving.
4. Know the C programming language and use it to write original code for problem solving,
5. Know the tools for software development in C and use them to analyze complex problems, to construct solution and to code them in C.
6. Collaborate within a team that develops algorithms and application in C.

Required Textbook:

1. Programming with C, 3rd Edition, BYRON GOTTFRIED

Reference books/Handouts:

2. Programming with C, 3rd Edition, STEPHEN G. KOCHEN
3. Handouts, delivered by the Instructor.

CSE 134 Computer Programming Lab Credit: 1.50

Course Content

In this course students will perform experiments to verify practically the theories and concepts learnt in CSE 133.

CourseObjectives

Theobjectivesof thecourseareto

- Students will be able to simplify of Boolean expressions using standard methods.
- They will be able to solve sequential logic circuits with the acquired knowledge of flip flops
- They will be able to Design combinational and / or sequential circuits to meet the given specifications / constraints.

ME 231 Basic Mechanical Engineering Credit: 3.00

Introduction to sources of energy, renewable and non-renewable energy sources and their potential.

Thermodynamics: Systems and surroundings, conversion of energy, different thermodynamic processes, energy transfer as heat for a control volume. Reversibility and irreversibility, definition and corollaries of second law of thermodynamics, Entropy.Analysis of different thermodynamic cycles, representation of various cycles on PV and TS planes.

Internal combustion engines: Introduction to internal combustion engines and their cycles. Heat engines, diesel engines, petrol engines. Study of Gas turbines with their accessories. Study of steam generation and steam turbines,steam generating units with accessories and mountings.

Refrigeration and air conditioning: Refrigeration and air conditioning with their applications.

Turbomachineries: Pelton wheel, Francis turbine, Kaplan turbine, centrifugal and reciprocating pumps, fans, blowers and compressors.

Text Book:

Fundamentals of Mechanical Engineering: R. L. Timings

Reference Book:

Mechanical Engineering Fundamentals and Problem Solving: ArvidEide, Roland Jenison, Larry Northup, and Steven Mickelson

ME 232 Basic Mechanical Engineering Lab Credit: 1.50

In this course students will perform experiments to verify practically the theories and concepts learned in ME 231.